CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA 1983-84 CATALOG

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CALIFORNIA STATE UNIVERSITY

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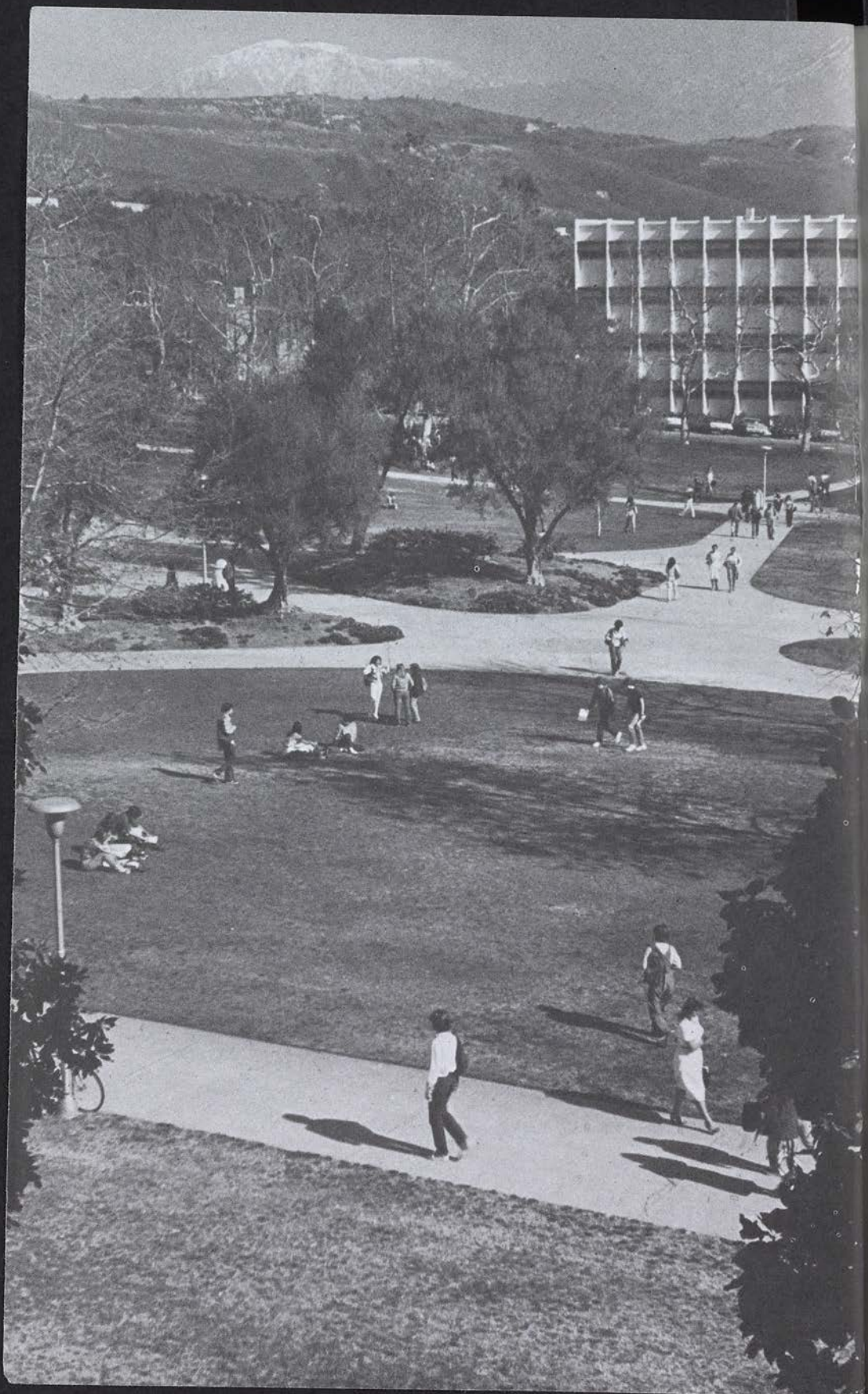
The California State University



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ACADEMIC CALENDAR—1983–84 *

(Check with the Admissions Office for application filing periods for impacted programs)

SUMMER QUARTER, 1983

Applications and Admissions

Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs.

Academic Instruction

June 20 ..... Beginning of university year Classes begin for all students

July 4 ..... Independence Day—Academic Holiday

August 29-September 1 ..... Final examinations

September 6 ..... Last Day to submit approved Master's Thesis/Project for binding; Grades due

Scheduling and Registration

June 16 ..... Orientation of new students

June 27 ..... Last day to drop classes without courses being recorded

June 30 ..... Last day to add classes or register late

July 5 ..... Last day to withdraw and receive refund of THE STUDENT SERVICES, and State University fees

July 14 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons

July 21 ..... Last day to apply for current quarter graduation

July 28 ..... Current deadline for next quarter scheduling

August 4 ..... Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

JUNE

S	M	T	W	T	F	S
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5	6	7	8	9	10	11
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JULY

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31						

AUGUST

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FALL QUARTER, 1983

Applications and Admissions

Applications will be accepted into any program until capacity is reached up to beginning of the quarter except for impacted programs.

Academic Instruction

September 19 ..... Beginning of Academic year and fall quarter for faculty

September 22 ..... Classes begin for all students

November 11 ..... Veterart's Day—Academic Holiday

November 24-25 ..... Thanksgiving—Academic Holiday

December 5-9 ..... Final examinations

December 12-2 January ..... Christmas—Academic Holiday

December 13 ..... Last day to submit approved Master's Thesis/Project for binding; Grades due

SEPTEMBER

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OCTOBER

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30	31					

Scheduling and Registration

September 21 ..... Supplemental registration
September 20–21 ..... Orientation of new students
September 28 ..... Last day to drop classes without courses being recorded
October 3 ..... Last day to add classes or register late
October 6 ..... Last day to withdraw and receive refund of THE STUDENT SERVICES and State University fees
October 12 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons
October 21 ..... Last day to apply for current quarter graduation
November 8 ..... Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control
November 10 ..... Current deadline for next quarter scheduling

WINTER QUARTER, 1984

Applications and Admissions

Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs.

Academic Instruction

January 3 ..... Classes begin for all students
February 20 ..... Washington's Birthday—Academic Holiday
March 12–16 ..... Final examinations
March 20 ..... Last Day to submit approved Master's Thesis/Project for binding; Grades due

Scheduling and Registration

December 27 ..... Orientation of new students
January 9 ..... Last day to drop classes without courses being recorded
January 12 ..... Last day to add classes or register late
January 17 ..... Last day to withdraw and receive refund of THE STUDENT SERVICES and State University fees
January 23 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons
January 27 ..... Last day to apply for current quarter graduation
February 2 ..... Current deadline for next quarter scheduling
February 16 ..... Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

NOVEMBER

S	M	T	W	T	F	S	
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DECEMBER

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JANUARY

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FEBRUARY

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26	27	28	29				

MARCH

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25	26	27	28	29	30	31	

Finals

SPRING QUARTER, 1984

Applications and Admissions
Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs.

Academic Instruction

March 26 ..... Classes begin for all students
May 28 ..... Memorial Day—Academic Holiday
June 4-8 ..... Final examinations
June 8 ..... Last Day to submit approved Master's Thesis/Project for binding;
June 9 ..... Commencement
June 12 ..... Grades due
June 7 .....—for graduating seniors

Scheduling and Registration

March 22 ..... Orientation of new students
March 30 ..... Last day to drop classes without courses being recorded
April 4 ..... Last day to add classes or register late
April 9 ..... Last day to withdraw and receive refund of THE STUDENT SERVICES, and State University fees
April 13 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons
April 13 ..... Last day to apply for current quarter graduation
May 10 ..... Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control
April 27 (Su) ..... Current deadline for next
May 18 (F) ..... quarter scheduling

APRIL

S	M	T	W	T	F	S
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15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

MAY

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		1	2	3	4	5
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13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

SUMMER QUARTER, 1984

Applications and Admissions
Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs.

Academic Instruction

June 18 ..... Beginning of university year. Classes begin for all students
July 4 ..... Independence Day—Academic Holiday
August 27-30 ..... Final examinations
September 4 ..... Last Day to submit approved Master's Thesis/Project for binding; Grades due

Scheduling and Registration

June 14 ..... Orientation of new students
June 25 ..... Last day to drop classes without courses being recorded
June 28 ..... Last day to add classes or register late

JUNE

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

JULY

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

July 2 ..... Last day to withdraw and receive refund of THE STUDENT SERVICES and State University fees

July 12 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons

July 19 ..... Last day to apply for current quarter graduation

July 26 ..... Current deadline for next quarter scheduling

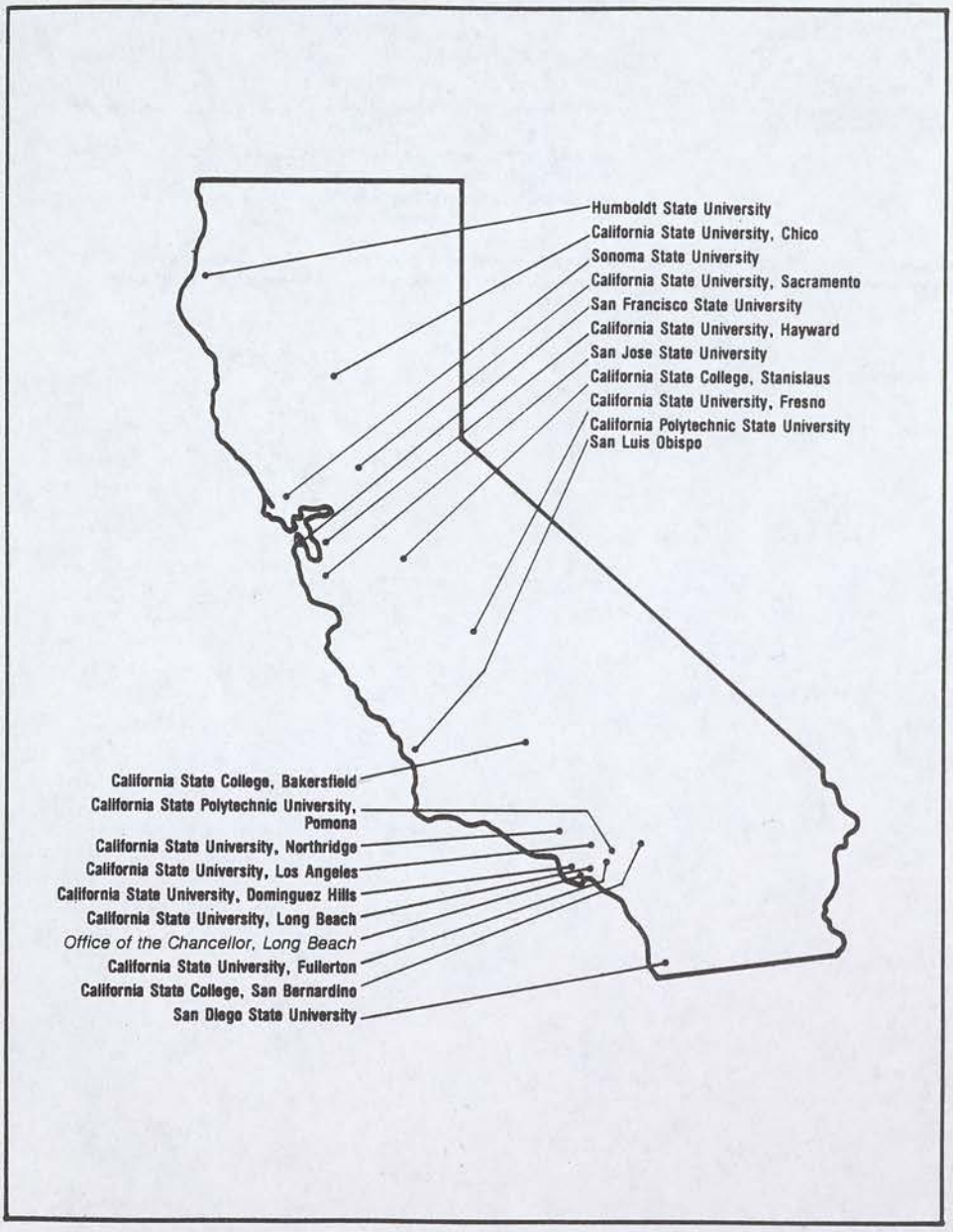
August 2 ..... Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

AUGUST

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

* Note: Some academic calendar dates may be subject to change subsequent to publication of the catalog. For the purposes of degree evaluation the academic year is defined as Fall, Winter, Spring, and Summer quarters.

THE CALIFORNIA STATE UNIVERSITY



THE CALIFORNIA STATE UNIVERSITY

The individual California State Colleges were brought together as a system by the Donahoe Higher Education Act of 1960. In 1972 the system became The California State University and Colleges and in 1982 the system became The California State University. Today, 16 of the 19 campuses have the title, "university."

The oldest campus—San Jose State University—was founded as a Normal School in 1857 and became the first institution of public higher education in California. The newest campus—California State College Bakersfield—began instruction in 1970.

Responsibility for The California State University is vested in the Board of Trustees, whose members are appointed by the Governor. The Trustees appoint the Chancellor, who is the chief executive officer of the system, and the Presidents, who are the chief executive officers on the respective campuses.

The Trustees, the Chancellor and the Presidents develop systemwide policy, with actual implementation at the campus level taking place through broadly based consultative procedures. The Academic Senate of The California State University, made up of elected representatives of the faculty from each campus, recommends academic policy to the Board of Trustees through the Chancellor.

Academic excellence has been achieved by The California State University through a distinguished faculty, whose primary responsibility is superior teaching. While each campus in the system has its own unique geographic and curricular character, all campuses, as multipurpose institutions, offer undergraduate and graduate instruction for professional and occupational goals as well as broad liberal education. All of the campuses require for graduation a basic program of "General Education-Breadth Requirements" regardless of the type of bachelor's degree or major field selected by the student.

The CSU offers more than 1,500 bachelor's and master's degree programs in some 200 subject areas. Nearly 500 of these programs are offered so that students can complete all upper division and graduate requirements by part-time late afternoon and evening study. In addition, a variety of teaching and school service credential programs are available. A limited number of doctoral degrees are offered jointly with the University of California and with private institutions of California.

The Consortium of the CSU draws on the resources of the 19 campuses to offer regional and statewide off-campus degree, certificate, and credential programs to individuals who find it difficult or impossible to attend classes on a campus. In addition to Consortium programs, individual campuses also offer external degree programs.

Enrollments in fall 1982 totaled over 315,000 students, who were taught by a faculty of 18,000. Last year the system awarded over 50 percent of the bachelor's degrees and 30 percent of the master's degrees granted in California. More than 800,000 persons have been graduated from the 19 campuses since 1960.

THE CONSORTIUM OF THE CALIFORNIA STATE UNIVERSITY

The Consortium of The CSU—"The 1,000-Mile Campus"—is a separate fully accredited, degree-granting entity of The CSU. It draws on the combined resources of the 19 campuses to offer external statewide and regional degree, certificate, and teaching credential programs.

The Consortium was established in 1973 to meet the needs of adults who find it difficult or impossible to participate in regular on-campus programs. Instruction is thus provided students in convenient places at convenient times. Currently, programs are offered in more than 20 geographic areas throughout California.

Full- and part-time CSU faculty, as well as qualified experienced practioners, go where the students are, or provide opportunities for individualized home study. Programs can be tailored to meet the specific needs of employees in business, industry, education, or government.

Consortium programs are upper division or graduate level. All courses offer residence credit leading to bachelor's or master's degrees. Credit and course work are transferable statewide. Programs are financed by student fees.

Academic policy for The Consortium is established by the statewide Academic Senate of the CSU. Degrees or certificates are awarded by The Consortium in the name of the Board of Trustees of The CSU. The Consortium is accredited by the Western Association of Schools and Colleges.

For more information contact: The Consortium of The California State University, 400 Golden Shore, Long Beach, California 90802; (213) 590-5696.

The statewide Admissions and Records Office may be reached by dialing the following numbers: Los Angeles and Long Beach areas (213) 590-5696; all other areas in California toll free (800) 352-5717

TRUSTEES OF THE CALIFORNIA STATE UNIVERSITY

EX OFFICIO TRUSTEES

The Honorable George Deukmejian
Governor of California
State Capitol
Sacramento 95814

The Honorable Leo T. McCarthy
Lieutenant Governor of California
State Capitol
Sacramento 95814

The Honorable Willie L. Brown, Jr.
Speaker of the Assembly
State Captiol
Sacramento 95814

The Honorable Louis "Bill" Honig
State Superintendent of Public Instruction
721 Capitol Mall
Sacramento 95814

Dr. W. Ann Reynolds
Chancellor of The California State University
400 Golden Shore
Long Beach 90802

APPOINTED TRUSTEES

Appointments are for a term of eight years, except for a student Trustee and alumni Trustee whose terms are for two years. Terms expire in the year in parentheses. Names are listed in order of appointment to the Board. Appointments are subject to confirmation by the State Senate.

Dr. Claudia H. Hampton (1986)
4157 Sutro Ave., Los Angeles 90008

Mr. Willie J. Stennis (1983)
Golden Bird, Inc.
3947 Landmark, Culver City 90230

Dr. Juan Gomez-Quinones (1984)
Professor, History Department
University of California, Los Angeles
405 Hilgard Ave., Los Angeles 90024

Mr. John F. O'Connell (1984)
Bechtel Power Corp.
P.O. Box 3965, San Francisco 94119

Ms. Blanche C. Bersch (1984)
415 No. Camden Dr., Suite 107
Beverly Hills 90210

Mr. Michael R. Peevey (1985)
California Council for Environmental & Economic Balance
215 Market St., Suite 1311, San Francisco 94105

Mr. John F. Crowley (1985)
1855 Folsom St., 5th Floor, San Francisco 94103

Ms. Wallace Albertson (1986)
1618 Sunset Plaza Dr., Los Angeles 90069

Mr. Donald G. Livingston (1987)
Carter Hawley Hale Stores, Inc.
550 S. Flower St., Los Angeles 90071

Ms. Celia I. Ballesteros (1987)
Keating Building
432 F Street, Suite 406, San Diego 92101

Mrs. Lynne Myers (1988)
514 Doheny Rd., Beverly Hills 90210

Dr. August F. Coppola (1988)
Zoetrope Studios
1040 N. Las Palmas Ave., Los Angeles 90038

Mr. George M. Marcus (1989)
Marcus & Millichap Incorporated
2626 Hanover St., Palo Alto 94304

Mr. Dixon R. Harwin (1990)
Alwin Management Company, Inc.
9300 Wilshire Blvd., Beverly Hills 90212

Mr. Thomas J. Bernard (1989)
Tomar, Inc.
776 E. Shaw Ave., Suite 102
Fresno 93710

Mr. Roland E. Arnall (1990)
REA Companies
11878 LaGrange, Los Angeles 90025

Mr. Daniel J. Branfman
Associated Students Office
Sonoma State University
1801 East Cotati Ave., Rohnert Park 94928

Dr. Robert D. Kully (1985)
1814 S. Marengo Ave., #24, Alhambra 91803

Roy T. Brophy (1991)
Gannon/Brophy Organization, Amherst Grove
3040 Explorer Dr., Sacramento 95827

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President

Mr. John F. O'Connell
Chairman

Mrs. Lynne Myers
Vice Chair

Chancellor W. Ann Reynolds
Secretary-Treasurer

OFFICE OF THE CHANCELLOR

The California State University
400 Golden Shore
Long Beach, California 90802
(213) 590-5506

Dr. W. Ann Reynolds ..... *Chancellor*

Mr. Harry Harmon ..... *Executive Vice Chancellor*

Mr. D. Dale Hanner ..... *Vice Chancellor, Business Affairs*

Dr. Alex C. Sherriffs ..... *Vice Chancellor, Academic Affairs*

Dr. Robert Tyndall ..... *Acting Vice Chancellor, Faculty and Staff Affairs*

Mr. Mayer Chapman ..... *Vice Chancellor and General Counsel*

THE CALIFORNIA STATE UNIVERSITY

California State College, Bakersfield
9001 Stockdale Highway
Bakersfield, California 93309
_____, President
(805) 833-2011

California State University, Chico
1st & Normal Streets
Chico, California 95929
Dr. Robin S. Wilson, President
(916) 895-6116

California State University, Dominguez Hills
Carson, California 90747
Dr. Donald R. Gerth, President
(213) 515-3300

California State University, Fresno
Shaw and Cedar Avenues
Fresno, California 93740
Dr. Harold H. Hack, President
(209) 294-4240

California State University, Fullerton
Fullerton, California 92634
Dr. Jewel Plummer Cobb, President
(714) 773-2011

California State University, Hayward
Hayward, California 94542
Dr. Ellis E. McCune, President
(415) 881-3000

Humboldt State University
Arcata, California 95521
Dr. Alistair W. McCrone, President
(707) 826-3011

California State University, Long Beach
1250 Bellflower Boulevard
Long Beach, California 90840
Dr. Stephen Horn, President
(213) 498-4111

California State University, Los Angeles
5151 State University Drive
Los Angeles, California 90032
Dr. James M. Rosser, President
(213) 224-0111

California State University, Northridge
18111 Nordhoff Street
Northridge, California 91330
Dr. James W. Cleary, President
(213) 885-1200

California State Polytechnic University, Pomona
3801 West Temple Avenue
Pomona, California 91768
Dr. Hugh O. LaBounty
President
(714) 598-4592

California State University, Sacramento
6000 J Street
Sacramento, California 95819
Dr. Austin J. Gerber, Acting President
(916) 454-6011

California State College, San Bernardino
5500 State College Parkway
San Bernardino, California 92407
Dr. Anthony H. Evens, President
(714) 887-7201

San Diego State University
5300 Campanile Dr.
San Diego, California 92182
Dr. Thomas B. Day, President
(619) 265-5000

Imperial Valley Campus
720 Heber Avenue
Calexico, California 92231
(619) 357-3721

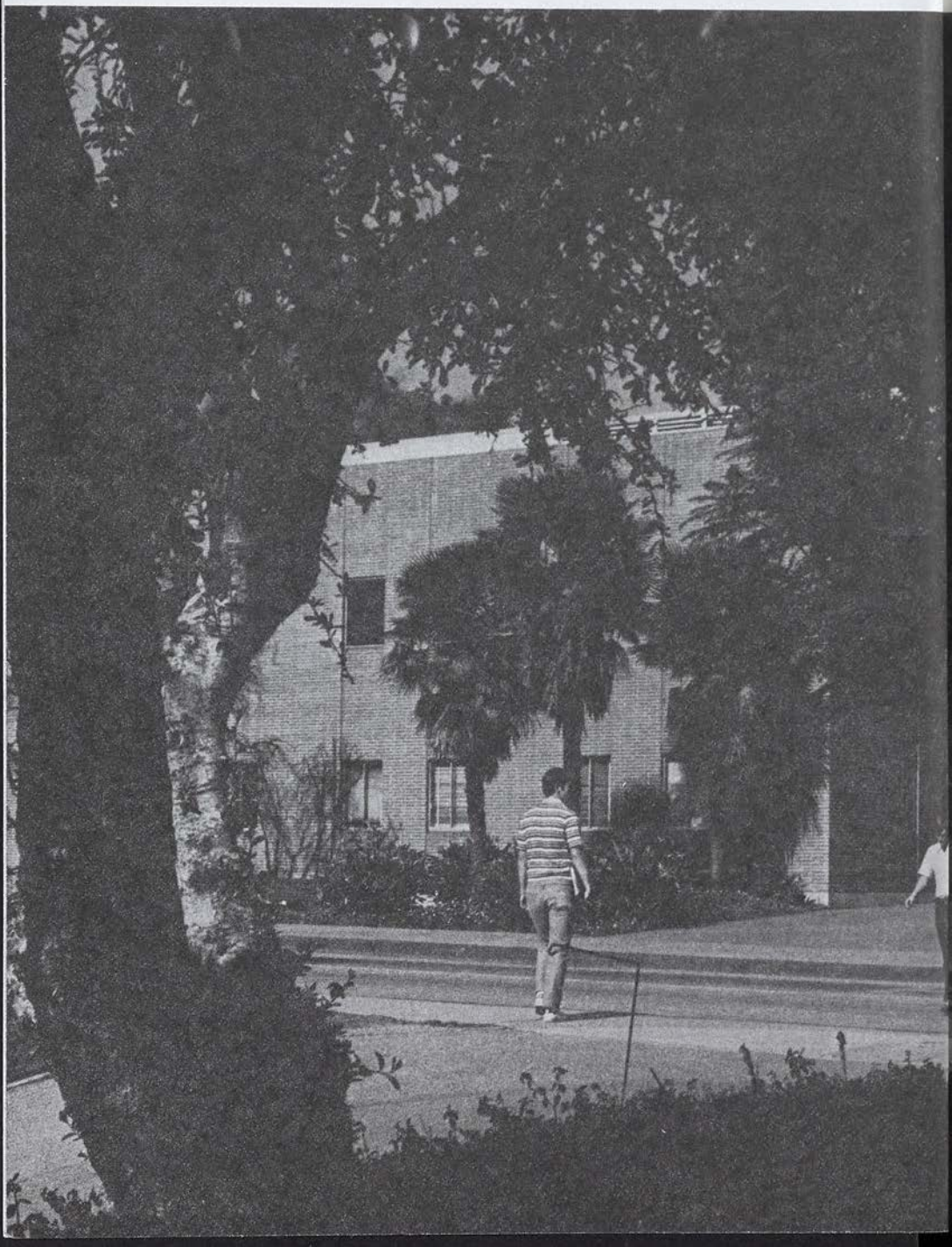
San Francisco State University
1600 Holloway Avenue
San Francisco, California 94132
_____, President
(415) 469-2141

San Jose State University
One Washington Square
San Jose, California 95192
Dr. Gail Fullerton, President
(408) 277-2000

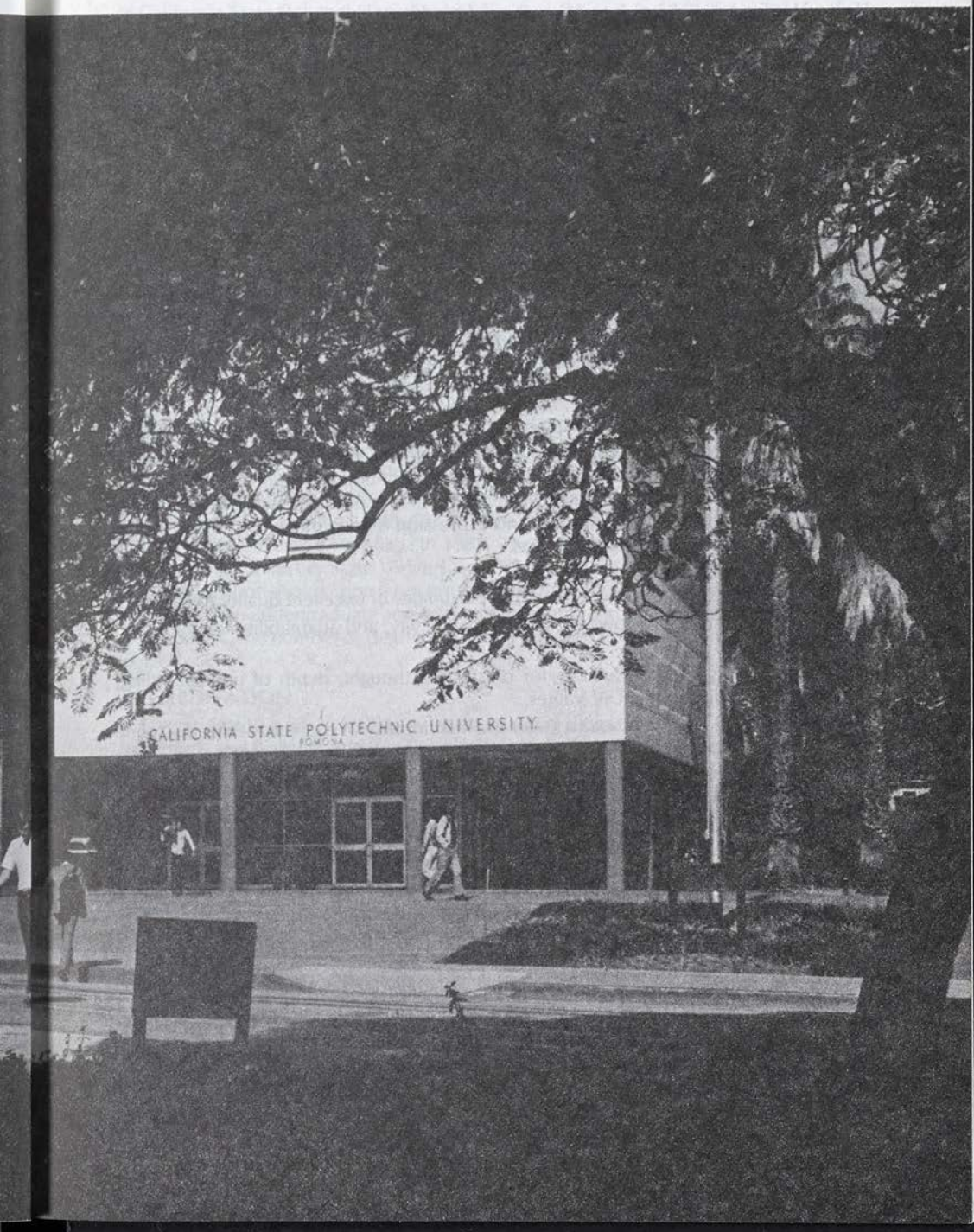
California Polytechnic State University, San Luis Obispo
San Luis Obispo, California 93407
Dr. Warren J. Baker, President
(805) 546-0111

Sonoma State University
1801 East Cotati Avenue
Rohnert Park, California 94928
Dr. Peter Diamandopoulos, President
(707) 664-2880

California State College, Stanislaus
800 Monte Vista Avenue
Turlock, California 95380
Dr. A. Walter Olson, President
(209) 667-3122



GENERAL ADMINISTRATION



CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

UNIVERSITY ADMINISTRATION

Hugh O. LaBounty, *President*

John W. Francis, *Associate Vice President for Administration*

William E. Fox, *Director of Business Affairs and Senior Advisor to the President*

Paul F. Weller, *Vice President for Academic Affairs*

James Bell, *Vice President for Administration and Student Affairs*

Kenneth H. Anderson, *University Dean for Programs and Planning*

PURPOSES AND OBJECTIVES

California State Polytechnic University, Pomona is dedicated to the fullest development of the potential of each individual and to the individual's productive application of knowledge. The university provides an atmosphere of free inquiry and social awareness. Its students have the opportunity to acquire skills, intellectual habits, critical attitudes, and broad perspectives which will help them function in society and contribute to its betterment.

This university specializes in career-oriented professional and liberal education which prepares its students in a variety of disciplines. It recognizes the importance of continuing education, international programs, and diversity of student body. The university's primary purpose is to teach, but it also recognizes that research is important to good teaching and the search for truth. Freedom of thought and expression is encouraged in the classroom, in the laboratory, and in student activities.

The major goals of this university are:

1. To provide career-oriented educational opportunities of excellent quality to students.
2. To increase the student's powers of inquiry, creativity, and adaptability for study and experimentation.
3. To develop the student's capacity for disciplined thought, depth of understanding, sympathy, and discernment of values.
4. To seek new and creative ways to foster the individuality of each academic discipline and the interaction among the technologies, the arts, and the sciences.
5. To promote and continue the intellectual development of aesthetics and culture in its students, in its graduates, and in the general community.
6. To participate in international education through its curricula, its students, and through cooperation with both national and international governmental agencies.
7. To strengthen a tradition for joint enterprise among students, faculty, administration, and staff in promoting excellence and in developing university programs and policies.
8. To utilize all available resources effectively, efficiently, and wisely.

The quality of this university depends upon the people drawn to it by its stated objectives and its vision. By reaching for excellence in the pursuit of learning, the university enriches not only itself but also the communities it serves.

HISTORICAL DEVELOPMENT

In 1966, the California Legislature established California State Polytechnic College, Kellogg-Voorhis as an independent state college. Thus ended almost three decades of direct legal and administrative relationship between this institution and its parent institution, Cal Poly, San Luis Obispo.

In 1938, the 157-acre Voorhis School for Boys became the Southern California branch of California State Polytechnic School of San Luis Obispo. In 1945, the parent institution was renamed California State Polytechnic College. The 813-acre W. K. Kellogg Arabian Horse Ranch near Pomona was deeded to the State in 1949, and in 1956 it became the second campus of the college's southern facility.

Six programs in agriculture leading to four bachelor of science degrees were offered in 1956. By 1959, the curricula of the college also included six degree programs in the arts and sciences and four in engineering.

Many profound changes were made in 1961 which affected Cal Poly. The Master Plan for Higher Education established the California State College System with its own Board of Trustees in 1961. In that same year, the Legislature enacted *Education Code* Section 22606 which identifies the primary function of the State Colleges as ". . . the provision of instruction for undergraduate students and graduate students, through the master's degree, in the liberal arts and sciences, in applied fields and in the professions, including the teaching profession." The Legislature recognized the special responsibility of this institution as a "polytechnic college" by adding *Education Code* Section 24751 which authorizes the college to emphasize ". . . the applied fields of agriculture, engineering, business, home economics, and other occupational and professional fields." In 1966, California State Polytechnic College, Pomona was established as a separate college.

On November 29, 1971, the governor signed into law Assembly Bill 123, the enabling legislation to change the name of the California State Colleges to the California State University and Colleges and also authorized changes in name of those colleges which met the required academic definition of university. This institution was one of those which met this definition, and on June 1, 1972, the campus name was changed to California State Polytechnic University, Pomona. In 1982, The California State University and Colleges became The California State University.

The educational programs have grown from 6 undergraduate programs enrolling 550 men in 1956 to undergraduate and graduate programs enrolling currently over 16,000 men and women. The number of degrees granted increased from 54 in June 1957 to over 2,000 in 1981.

ACCREDITATION

The university is accredited as a degree-granting institution by the Western Association of Schools and Colleges and is authorized by the California State Commission for Teacher Preparation and Licensing to recommend candidates for credentials in Multiple Subjects, Single Subjects, the Reading Specialist, the Bilingual/Cross Cultural Specialist, (Spanish), and the Learning Handicapped and Severely Handicapped Specialist Credentials in Special Education.

The School of Engineering is accredited by the Accreditation Board for Engineering and Technology (ABET) for its baccalaureate programs in aerospace engineering, civil engineering, chemical and materials engineering, electrical engineering, industrial engineering, mechanical engineering, and engineering technology.

The Department of Social Services in the School of Arts has its program accredited by the Council on Social Work Education.

The School of Environmental Design is accredited by the American Society of Landscape Architects for its program in landscape architecture and recognized by the American Planning Association for its program in urban planning. The Master of Architecture is accredited by the National Architectural Accrediting Board.

The School of Science is accredited by the American Chemical Society for its program in chemistry.

THE UNIVERSITY SEAL

The seal is used for all official acts of the university. It appears on official documents and represents a verification of the university's approval of actions and events. The figure in the seal's center is a representation of the head of the university's ceremonial mace which represents through its five branches the major disciplines of learning basic to the curricula of the university: the arts, commerce, the humanities, the sciences, and technology. Surrounding the seal is a black band which circles the designation "California State Polytechnic University, Pomona" and the founding date, 1938. Above the stylized mace is the motto: INSTRUMENTUM DISCIPLINAE.

THE UNIVERSITY SYMBOL

The university symbol is a stylized tree. The tree symbol is one of the most essential of traditional symbols. In its most general sense, the symbolism of the tree denotes the life of the cosmos: its consistence, growth, proliferation, generative and regenerative processes. The tree, with its roots underground and its branches rising to the sky, symbolizes an upward trend. It is used on documents, publications, and other public forms.

The Campus

LOCATION

Located south of the San Bernardino Freeway (Route 10) on the eastern slope of Kellogg Hill, the campus is one of the largest in the state university system. The buildings represent a careful blending of the tile-roofed Spanish ranch structures built by W. K. Kellogg and the modern laboratory and classroom buildings of concrete and red brick. Campus development has preserved the beauty of the ranch and its original plantings. The combination of agricultural and livestock areas with science, engineering, and liberal arts facilities provides for the full range of instruction in the Cal Poly program. (See campus map in back of catalog.)

A multi-level interchange, which is a link for the San Bernardino, Corona, Orange,

Foothill, Pomona and Riverside Freeways, is located near the northeast corner of the campus. Only forty minutes from the downtown areas of Los Angeles and San Bernardino, the university is also within easy freeway access from communities in Los Angeles, Orange, San Bernardino and Riverside counties (See freeway map in back of catalog.)

ADMINISTRATION BUILDING

A large three-story structure facing the central quadrangle, the Administration Building (1) houses the university executive and business offices, various support services, and instructional units. The latter include classrooms, conference rooms, and faculty offices for English, foreign languages, communication arts, journalism, and student publications laboratories.

* Numbers in parentheses indicate building locations on campus map.

LIBRARY

The University Library (15) is housed in a modern, four-story building opened in 1969. The library, with floor space of 144,000 square feet and reader stations for 1,450 students, is centrally located on campus. The collections exceed 1.2 million items; included are 375,000 volumes, 977,000 microforms, 8,100 maps, and 52,892 technical reports. The library subscribes to 2,900 periodicals and 50 newspapers. The library's special facilities and services include group study rooms, a map room, equipment and facilities for disabled students, floor plans of the building, information guides, computerized checkout system, computer-assisted search services, a library handbook; and personal assistance in using the library's resources are available at four service desks. Through reciprocal lending agreements and inter-library loan services, students may acquire materials from other libraries.

AGRICULTURAL FACILITIES

The chief agricultural facility is the agriculture building (2) which contains laboratories, classrooms, faculty offices, and the school offices. Additional laboratories and offices are located in the environmental design building (7).

The agricultural engineering building (45) houses shops, laboratories and classrooms for instruction in farm power and machinery, agricultural mechanics, carpentry, irrigation, and surveying.

Agricultural programs are also conducted at the Fruit Industries-Agronomy Unit (28) which includes a complete citrus packing house, and at the Ornamental Horticulture Unit (19) which includes 18 plant production facilities and the Raymond Burr orchid collection.

Directly related to animal science and other agricultural programs are the production units: a beef unit, meats processing building, honey extraction unit, poultry plant and feed mill (30–34), and swine and small ruminant units (37–38).

The W. K. Kellogg Arabian Horse Center (29) and horse show arena are operated as an instructional facility and also used for the Sunday Arabian horse shows. The Equine Research Center forms part of this complex.

Campus acreage utilized by the School of Agriculture for instruction includes areas for field, vegetable, and forage crops, irrigated and natural pastures, citrus fruit and avocados and ornamental plantings. In addition to campus acreage, the School of Agriculture operates through the university's Kellogg Unit Foundation, the Pine Tree Ranch, a 53-acre instructional citrus and avocado ranch in Ventura County.

ARTS FACILITIES

Facilities for the School of Arts are found in many areas of the campus. The school offices along with the departments of behavioral science, history, political science, and social sciences are located in the School of Arts Building (5). Besides general classrooms and faculty offices, the building also houses the Media Resources Center, broadcast

laboratories, Social Data Instructional Center, and the Teacher Preparation Center.

Journalism, student publication offices, the forensic program, and related faculty offices are located on the third floor of the administration building (1). Facilities for teaching art classes are located in the Aerospace, Chemical, and Industrial Engineering Building (12).

The performing arts center is a two-building complex for instruction in music and drama. The Drama Building (25) contains a 500-seat theater, a large rehearsal room adaptable as a small central-staging theater, make-up and costume rooms, scenery shops, classrooms, and offices. The Music Building (24) includes choral and orchestra rooms, offices, individual practice rooms, and a music library.

The physical education facility (41–44) includes multipurpose buildings for instruction in physical education, athletics, recreation, and specialized health, athletic training and adaptive physical education programs. These facilities include gymnasiums, swimming pools, handball and tennis courts, fields for team sports, a track, a baseball field and a football field.

BUSINESS ADMINISTRATION FACILITIES

School of Business Administration operations are centered in the two-story Business Building (6) on the central quadrangle. This structure contains classrooms, accounting and business machine laboratories, facilities for merchandising displays, faculty offices, and the school offices. Some instructional facilities for the school are also located in the Engineering Center (9). Additional faculty offices are located in the Campus Center (97).

ENGINEERING FACILITIES

The School of Engineering facilities consist of seven buildings. A five-story Engineering Center (9) houses the school's administrative office, as well as classrooms, electrical, computer and electronics laboratories, and faculty offices. The other structures contain additional offices, classrooms and discipline-related laboratories essential to instruction in aerospace, chemical, civil, electrical, electronics, industrial, manufacturing, and mechanical engineering, and engineering technology (10–14).

The design of the School of Engineering facilities and their operation emphasizes the School's mission to provide education in engineering fundamentals and theory as well as in the practical laboratory and field applications of that theory.

ENVIRONMENTAL DESIGN FACILITIES

The 50,000 square foot Environmental Design Building (7) houses studio-laboratories, multipurpose research facilities, a resource center, and classrooms for architecture, landscape architecture and urban planning, as well as faculty offices and the school offices. Additional studios, classrooms, a shop, photo laboratory, and print room are located in the adjacent School of Agriculture Building (2).

SCIENCE FACILITIES

Science facilities include the Science Building (3), which was the first instructional building on campus, and the Science Building addition (8). Both buildings contain faculty offices, classrooms and laboratories. Advanced laboratories for instruction in the biological sciences, chemistry, geosciences, mathematics and physics are housed in the Science Building addition. Also located in the addition are the School of Science's administrative offices and the University Computer Center.

UNIVERSITY UNION

The University Union is designed for social, cultural, and recreational activities with lounges, music listening room, exhibit areas, a little theatre, and different types of food service. In addition, there are meeting rooms and working areas for clubs and organizations. It is a short distance from the University Union to the Union Plaza, the restored and renovated W. K. Kellogg former stables, (26), which now houses the offices of the Student Development Department and the Associated Students, Inc. (ASI). The El Patio

Bookstore and the student cafeteria are located in the Campus Center (97). The business office of the ASI is located in the University Union.

THE DUPLEX

The Duplex (95) is located directed accross from the El Patio College Bookstore and houses the Educational Opportunity Program (EOP), The Women's Center and The University Advising Center.

STUDENT RESIDENCE AREA

Six residence halls (20, 21, 22, 23, 57, 58) accommodating 1180 students line University Drive. Behind the halls is a 600-seat residence student dining commons (70). Overlooking the pond is the Residence Reception Center (59) which includes lounges and facilities for social events, and the Housing Office and Office of Residence Life.

HEALTH CENTER

The Health Center (46) provides ambulatory student care by qualified physicians, for acute and subacute conditions by appointment and on an emergency basis. It is open Monday through Thursday between 8:00 a.m. and 7:00 p.m., and Friday from 8:00 a.m. to 5:00 p.m. Services include X-ray, physical therapy, pharmacy, laboratory, immunizations, allergy desensitization, family planning, and health counseling. No overnight infirmary care is available, but daytime bed rest facilities are provided. Most of the services are paid for from the student services fee with a minor charge in some cases.

OFFICIAL RESIDENCE/UNIVERSITY HOUSE

The Manor House (111) is the official residence of the university president; the former W. K. Kellogg Mansion (112) is used for housing of university guests. Also forming part of the mansion is The University House used by campus faculty and staff for meetings and social events. The adjoining grounds and ponds, and the collections of specimen plants in Sycamore and Palm Canyons, provide interesting natural settings for the campus.

Continuing Education

KELLOGG WEST

The Kellogg West Center for Continuing Education, under the direction of the Dean of Continuing Education, provides modern conference facilities for groups of from ten to two hundred. Its location on the campus enables conferees to make use of the resources and teaching staff of the university when appropriate. The Center's facilities include air-conditioned lodges with 87 double or single occupancy rooms, a large auditorium and dining rooms accommodating 350 people. Full professional staff support insures complete conference services. Through a staff of conference coordinators, businesses and organizations are offered assistance in conference planning, professional program evaluation, and in locating teaching personnel for their educational activities.

Since its opening in April 1971, Kellogg West has served banks, retail businesses, government organizations, trade and professional associations, corporations, clubs and educational institutions as well as other campuses of the CSUC and the Chancellor's Office.

The complex was made possible by a $3 million grant from the W. K. Kellogg Foundation in Battle Creek, Michigan, and was the 10th continuing education facility funded by that organization. It is the first established within a statewide system of higher education.

Businesses, organizations or groups interested in developing or holding a conference, institute or meeting at Kellogg West, may contact the bookings and reservations office at Kellogg West, California State Polytechnic University, Pomona, (714) 595-7511.

Other Programs in Continuing Education

Cal Poly recognizes an important community need by providing access to higher education beyond the typical established patterns of daytime instruction and full-time student enrollment. Through the university's Office of Continuing Education, assistance is given to groups and individuals who seek to improve and update their occupational competencies as well as enhance their personal and cultural enrichment through flexible educational programming.

Continuing education opportunities at Cal Poly cover several broad areas including both credit and noncredit activities, workshops, conferences, institutes, in-service training and relicensure programs as well as the familiar extension classes. Admission into a continuing education program does not constitute admission to the regular sessions of the university. All programs sponsored by the Office of Continuing Education are self-supporting and receive no state aid.

An external degree program, Master's in Engineering, is offered at Fluor Engineering Corporation. Full details are available at 714-598-4327.

To receive a bulletin of extension classes or further information on course offerings, fee schedules, etc., contact the Office of Continuing Education, located at Kellogg West, or call 714-598-4391.

Cal Poly Foundation

The Cal Poly Kellogg Unit Foundation, Inc., was organized on February 28, 1966 to provide the University with services and facilities which are an integral part of the educational program of the University but which cannot by law be financially supported by the state government. Primary services include the managing of all food services and the bookstore. Secondary services involve fiscal services for a variety of programs which include Aid-to-Instruction, the Kellogg West Center for Continuing Education, the Office of Development, assistance to academic programs and for research. The Aid-to-Instruction Program supports student projects and commercial enterprises in cooperation with the School of Agriculture. Contracts and grants from private and public agencies awarded to the University are administered by the Foundation.

The Foundation operates within the provisions of the California Revenue and Taxation Code Section 23701 (d) and the United States Internal Revenue Code, Section 501 (c) (3) and in conformity with regulations established by the Trustees of the California State University and approved by the California State Director of Finance as required by the California Education Code, Section 89900. The Foundation is supervised by the university administrative organization as required by Title 5, California Administrative Code, Section 42601 (c).

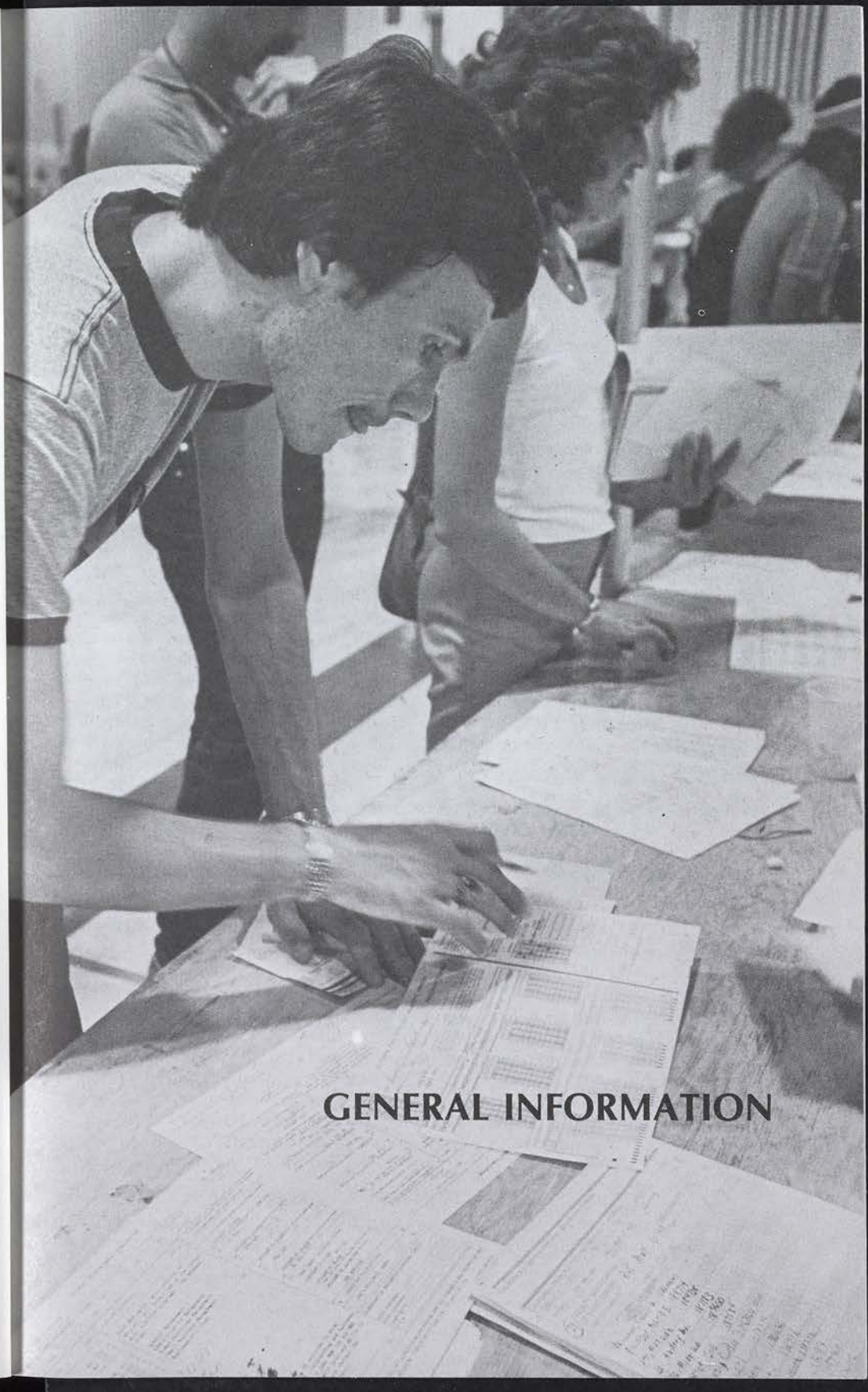
Alumni Association

The California State Polytechnic University, Pomona Alumni Association, Inc. is an association of graduates, former students and friends of the university. The operations of the organization are carried out by a board of directors comprised of a president, a secretary, a treasurer, six vice presidents representing the instructional schools of the university, a vice president in charge of special interest groups, seven directors, a student representative from the Associated Students, Inc., a university representative appointed by the president of the university, and the past president of the association.

In addition to regional and local meetings of alumni, the association welcomes members to receptions during Poly Vue, organizes class reunions, maintains the records of all graduates, sponsors a senior yearbook, is responsible for all alumni publications, including the official alumni newsletter, the *Challenge,* and annually honors a distinguished alumnus and an Alumnus of the Year by each school and the Teacher Preparation Center. Other service activities include representing the alumni on several universitywide committees,

to include the University Union Board, the Friends of the Library, Poly Vue Board, and the school advisory committees; and sponsoring the university's Annual Fund campaign for financial support of Cal Poly, the Voorhis Alumni Association scholarship, and the emergency Alumni-Student Loan Fund.

Information about the association may be obtained by writing the Alumni Office c/o the University or by calling 714-598-4748.



GENERAL INFORMATION

ADMISSIONS

Application Procedures

ADMISSIONS PROCEDURES AND POLICIES

Requirements for admission to California State Polytechnic University, Pomona are in accordance with Title 5, Chapter 1, Subchapter 3, of the *California Administrative Code.* If you are not sure of these requirements you should consult a high school or community college counselor or the admissions office. Applications may be obtained from the admissions office at any of the campuses of The California State University or at any California high school or community college.

New Admission Requirements Effective Fall 1984

If you plan to apply for admission during 1983–84 or later you should be aware that additional admission requirements become effective for applicants for fall 1984 and later. A first-time freshman will still need to meet the GPA test score requirements described above and in addition must have completed eight semesters of college preparatory English and four semesters of college preparatory mathematics. Your school will know what courses will count toward these requirements and when you should take them.

A few applicants may not have had the opportunity to take all of the required courses by 1984. The CSU will make some exceptions to these requirements during 1984–85 and 1985–86 for those who cannot schedule all of them in the time remaining in high school. If you are one of those few, your school will know about possible flexibility.

If you plan to enroll as a transfer from another college, you may also need to meet the new subject requirements, as well as the regular college unit and grade requirements. If you did not take the right courses in high school, you can take equivalent courses in college. Your counselor can advise whether the new policy will apply to you.

Don't assume that English and mathematics are the only important subjects in high school. In order to be well prepared you should plan to take a full college preparatory program including additional courses in mathematics, science, social science, foreign language, and the humanities/fine arts.

Effective fall quarter, 1984, all applicants for admission whose native language is not English must present a score of not less than 525 on the Test of English as a Foreign Language (TOEFL) unless the applicant has attended for at least three years an educational institution at the secondary level or beyond in which the principal language of instruction is English.

UNDERGRADUATE APPLICATION PROCEDURES

Prospective students, applying for part-time or full-time programs of study, in day or evening classes, must file a complete application as described in the application booklet. The $30 nonrefundable application fee should be in the form of a check or money order payable to The California State University and may not be transferred or used to apply to another term. Applicants need file only at their first choice campus. An alternative choice campus and major may be indicated on the application, but *applicants should list as alternative campus only that campus of The California State University that they can attend.* Generally, an alternative degree major will be considered at the first choice campus before an application is redirected to an alternative choice campus. Applicants will be considered automatically at the alternative choice campus if the first choice campus cannot accommodate them.

POST-BACCALAUREATE APPLICATION PROCEDURES

All applicants for any type of postbaccalaureate status (e.g., master's degree applicants, those seeking credentials, and those interested in taking courses for personal or profes-

sional growth) must file a complete application within the appropriate filing period. A complete application for postbaccalaureate status includes all of the materials required for undergraduate applicants (part A) plus the supplementary graduate admissions application (part B). Postbaccalaureate applicants who completed undergraduate degree requirements and graduated the preceding term are also required to complete and submit an application and the $30.00 nonrefundable application fee. Since applicants for postbaccalaureate programs may be limited to the choice of a single campus on each application, redirection to alternative campuses or later changes of campus choice will be minimal. In the event that a postbaccalaureate applicant wishes to be assured of initial consideration by more than one campus, it will be necessary to submit separate applications (including fees) to each. Applications may be obtained from the Graduate Studies Office of any California State University campus in addition to the sources noted for undergraduate applicants.

REDIRECTION

It is not always possible for the university to accommodate all qualified applicants. If an application is accepted and it later becomes evident that an opening will not be available, the application and any supporting documents will, at the request of the applicant, be forwarded to any state college or university where openings are available. No additional application fee is required.

IMPACTED PROGRAMS

Impacted programs are undergraduate programs in which the number of applications received in the first month of the filing period exceed the total spaces available, either locally (at an individual campus) or systemwide. You must make application for an impacted program during the first month of the filing period and may file more than one application and fee for additional programs. Nonresidents, foreign and domestic, are not considered for admission to impacted programs. High school and community college counselors are advised before the opening of the fall filing period which programs will be impacted.

Supplementary Admission Criteria

Each campus with impacted programs uses supplementary admission criteria in screening applicants. Campuses are authorized to use a freshman applicant's ranking on the eligibility index, the transfer applicant's overall GPA (Grade Point Average) or a combination of campus-developed supplementary criteria in selecting those to be admitted. If you are a freshman applicant and plan to apply to an impacted program, you should take the ACT or SAT test at the earliest date. Your test scores and your grades earned in the final three years of high school may be used in determining admission to the program. The supplementary admission criteria used by the individual campuses to screen applicants appear periodically in the CSU *Counselors Digest* and are sent by the campuses to all applicants seeking admission to an impacted program.

Unlike unaccommodated applicants to locally impacted programs, who may be redirected to another campus in the same major, unaccommodated applicants to systemwide impacted programs may not be redirected in the same major but may choose an alternative major either at the first choice campus or another campus.

SPACE RESERVATION NOTICES

Most applicants will receive some form of space reservation notice from their first choice campus within two months of filing the application. A notice that space has been reserved is also a request for records necessary to make the final admission decision. It is an assurance of admission *only* if evaluation of the applicant's previous academic record indicates that admission requirements have been met. Such a notice is not transferable to another term or to another campus.

UNDECLARED MAJOR

A first-time freshman student is allowed the option of declaring a major upon entrance to the university, or of entering the university without declaring a major. Individuals who enter as freshmen and who do not choose to declare a major at the time of entrance, must make the decision and declare a regular academic major by the end of the third quarter in attendance at the university. Individuals who transfer to the university must declare a major upon application to the university.

NONDISCRIMINATION POLICY

Sex

The California State University does not discriminate on the basis of sex in the educational programs or activities it conducts. Title IX of the Education Amendments of 1972, as amended, and the administrative regulations adopted thereunder prohibit discrimination on the basis of sex in education programs and activities operated by California State Polytechnic University, Pomona. Such programs and activities include admission of students and employment. Inquiries concerning the application of Title IX to programs and activities of California State Polytechnic University, Pomona may be referred to Ms. Glenda Morris, University Director of Affirmative Action, Engineering Center (9), Room 166, (714) 598-0586, the campus officer assigned the administrative responsibility of reviewing such matters or to the Regional Director of the Office of Civil Rights, Region 9, 1275 Market Street, 14th Floor, San Francisco, California 94103.

Handicap

The California State University does not discriminate on the basis of handicap in admission or access to, or treatment or employment in, its programs and activities. Section 504 of the Rehabilitation Act of 1973, as amended, and the regulations adopted thereunder prohibit such discrimination. Ms. Carol Goldstein, Director, Disabled Student Services, has been designated to coordinate the efforts of California State Polytechnic University, Pomona to comply with the Act in its implementing regulations. Inquiries concerning compliance may be addressed to this person at University Library Room 110, (714) 598-4810.

Race, Color, or National Origin

The California State University complies with the requirements of Title VI of the Civil Rights Act of 1964 and the regulations adopted thereunder. No person shall, on the grounds of race, color, or national origin be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program of The California State University.

HARDSHIP PETITIONS

There are established procedures for consideration of qualified applicants who would be faced with extreme hardship if not admitted. Prospective hardship petitioners should write the Admissions Office regarding specific policies governing hardship admission.

APPLICATION FILING PERIODS FOR 1983–84

Terms in 1983–84	*First Accepted*	*Filing Period Duration*	*Student Notification Begins*
Summer Qtr. 1983	Feb. 1. 1983	Each campus accepts applications until capacities are reached. Most campuses accept applications up to a month prior to the opening day of the term. Some campuses will close individual programs as they reach capacity.	March 1983
Fall Sem. or Qtr. 1983	Nov. 1, 1982		Dec. 1982
Winter Qtr. 1984	June 1, 1983		July 1983
Spring Sem. or Qtr. 1984	Aug. 1, 1983		Sept. 1983

Undergraduate Admission Requirements

First-time freshman eligibility is governed by an eligibility index. The index is computed using the high school grade point average on all course work completed in the last three years of high school, not counting physical education and military science; and the ACT composite, or the SAT total score.

Registration forms and test dates for either test may be obtained from high school or community college counselors, from the addresses below, or from the campus testing offices. For either test, submit the registration form and fee at least one month prior to the test date.

ACT Address

American College Testing Program, Inc., Registration Unit, P.O. Box 414, Iowa City, Iowa 52240

SAT Address

The College Board, P.O. Box 592, Princeton, New Jersey 08540

First-Time Freshman Applicants

California High School Graduates and Residents

If you graduated from a California high school or are legal residents for tuition purposes you need a minimum eligibility index of 741 (ACT) or 3072 (SAT). The following table illustrates grade point averages and minimum scores needed to qualify for admission. If your high school GPA is above 3.20 you are exempt from the test requirement.

ADMISSIONS TABLE FOR CALIFORNIA HIGH SCHOOL GRADUATES

GPA	ACT Score	SAT Score	GPA	ACT Score	SAT Score	GPA	ACT Score	SAT Score
(------)[1]			2.80	19	832	2.39	27	1160
3.20	11	512	2.79	19	840	2.38	27	1168
3.19	11	520	2.78	19	848	2.37	27	1176
3.18	11	528	2.77	19	856	2.36	27	1184
3.17	11	536	2.76	19	864	2.35	28	1192
3.16	11	544	2.75	20	872	2.34	28	1200
3.15	12	552	2.74	20	880	2.33	28	1208
3.14	12	560	2.73	20	888	2.32	28	1216
3.13	12	568	2.72	20	896	2.31	28	1224
3.12	12	576	2.71	20	904	2.30	29	1232
3.11	12	584	2.70	21	912	2.29	29	1240
3.10	13	592	2.69	21	920	2.28	29	1248
3.09	13	600	2.68	21	928	2.27	29	1256
3.08	13	608	2.67	21	936	2.26	29	1264
3.07	13	616	2.66	21	944	2.25	30	1272
3.06	13	624	2.65	22	952	2.24	30	1280
3.05	14	632	2.64	22	960	2.23	30	1288
3.04	14	640	2.63	22	968	2.22	30	1296
3.03	14	648	2.62	22	976	2.21	30	1304
3.02	14	656	2.61	22	984	2.20	31	1312
3.01	14	664	2.60	23	992	2.19	31	1320
3.00	15	672	2.59	23	1000	2.18	31	1328
2.99	15	680	2.58	23	1008	2.17	31	1336
2.98	15	688	2.57	23	1016	2.16	31	1344
2.97	15	696	2.56	23	1024	2.15	32	1352
2.96	15	704	2.55	24	1032	2.14	32	1360
2.95	16	712	2.54	24	1040	2.13	32	1368
2.94	16	720	2.53	24	1048	2.12	32	1376
2.93	16	728	2.52	24	1056	2.11	32	1384
2.92	16	736	2.51	24	1064	2.10	33	1392
2.91	16	744	2.50	25	1072	2.09	33	1400
2.90	17	752	2.49	25	1080	2.08	33	1408
2.89	17	760	2.48	25	1088	2.07	33	1416
2.88	17	768	2.47	25	1096	2.06	33	1424
2.87	17	776	2.46	25	1104	2.05	34	1432
2.86	17	784	2.45	26	1112	2.04	34	1440
2.85	18	792	2.44	26	1120	2.03	34	1448
2.84	18	800	2.43	26	1128	2.02	34	1456
2.83	18	808	2.42	26	1136	2.01	34	1464
2.82	18	816	2.41	26	1144	2.00	35	1472
2.81	18	824	2.40	27	1152	(——)[2]		

[1] Above 3.20 are eligible with any score.
[2] Below 2.0 are not eligible.

Nonresident

Applicants who are neither residents for tuition purposes nor graduates of a California high school need a minimum eligibility index of 826 (ACT) or 3402 (SAT). If your high school GPA is above 3.60 you are exempt from the test requirement.

Undergraduate Transfer Applicants (Resident and Nonresident)

Transfer admission eligibility is based on trasferable college units attempted, rather than on all college units attempted. California Community College transfers should consult their counselors for information on transferability of courses. If you are in good standing at the last institution attended you may be admitted as an undergraduate transfer if you meet either of the following provisions:

1. Eligible for admission in freshman standing (see freshman requirements) with a grade point average of "C" (2.0 on a scale where A = 4.0) or better in all transferable college units attempted.
2. Completed at least 56 transferable semester units or 84 transferable quarter units with a grade point average of "C" (2.0 on a scale where A = 4.0) or better if a California resident; nonresidents must have a grade point average of 2.4 or better.

International (Foreign) Students

UNDERGRADUATE VISA STUDENTS

Foreign visa students seeking admission to the U.S. on the basis of acceptance by Cal Poly Pomona, must file a special foreign student application on forms available from the admissions office. All documents required for admission must be on file not less than six months before the beginning of the quarter for which admission is desired.

Official transcripts of record, mark sheets, and other documents attesting to the scholarship of the applicant must be submitted in an English language translation which has been certified both as an authentic record of the student and a true translation by either a U.S. Embassy or Consulate or the American Friends of the Middle East. They will be evaluated under the regulations governing foreign student admission.

The U.S. Immigration Service requires F or J foreign visa undergraduate students to carry a minimum study load of 12 quarter units. Foreign students in graduate programs must carry not less than 8 units. Foreign students must comply with all University and U.S. Immigration Service regulations. The records office will routinely notify the Immigration Service of those students who fail to comply with this requirement. Such students are also subject to disqualification for failing to make satisfactory progress.

Undergraduate foreign visa students including those admitted to the U.S. as permanent residents must have a minimum score of 525 on the Test of English as a Foreign Language (TOEFL).

All F or J visa students are required to carry health and accident insurance during their stay at Cal Poly Pomona.

Applicants who have not completed any schooling beyond the twelfth year must submit transcripts of mark sheets for all studies or examinations completed in the tenth through twelfth years of schooling.

Admission will be granted only to those who, in the opinion of the appropriate university authority, demonstrate a strong likelihood of academic success at this university.

Applicants who have completed university or college work beyond the twelfth year, whether completed in the U.S. or not, must submit transcripts of all college level work in addition to the documents required of freshmen.

Foreign students who were admitted to the U.S. on the basis of their admission to another college or university are expected to complete at least one year of full time study at that institution. Foreign students who are transferring from another U.S. college or university will not be considered for admission unless they have earned at least a 2.5 GPA (A = 4.0), however a GPA of 2.5 does not guarantee admission.

Permission to transfer from one school to another must be obtained from the United States' Immigration and Naturalization Service.

Other Applicants

Applicants not admissible under one of the above provisions should enroll in a community college or other appropriate institutions. Only under the most unusual circumstances will such applicants be permitted to enroll in the university. Permission is granted only by special action.

A student transferring from a nonaccredited institution may be granted provisional admission if the above requirements are met.

A student who was on probation at the time of leaving the most recent college or university attended may be granted only provisional admission.

Reapplication After Failure to Enroll

Applicants who fail to register for the quarter for which they have been accepted will have their admission eligibility canceled. A new application must then be filed, and admission requirements existing for the term of the new application must be met.

All transcripts on file for students who apply but do not attend are kept for two years if the student so requests. These transcripts may be used for admission during that period. However, transcripts of any additional work completed since the original transcripts were filed must be requested by the applicant from the college(s) attended, as part of the new application procedure.

Returning Students

Students who have been absent without prior approval for any two consecutive quarters (excluding Summer) prior to the quarter of reapplication must apply for readmission. An application fee is charged before reentry in such cases. An application with fee also must be filed by any student who enrolls elsewhere during an absence, with the following exceptions: (1) a summer session or extension program; (2) dual registration, with prior approval; (3) concurrent or visitor enrollment in another California State University. A student who was disqualified following the last term of attendance must file an application for re-admission as a returning disqualified student.

Returning Veterans (Military or Alternative Service)

Students at Cal Poly Pomona entering active U.S. military service or approved alternative service are eligible for continuing student status following active service. Time served in active military or approved alternative service, including the entire quarter in which the student entered the service and the entire quarter in which he was discharged, will not be counted as a break in attendance in determining continuing student status.

Transfer Within State Universities or Colleges

Students enrolled in a California State University or College and eligible to continue are eligible for admission at any other institution in the system, provided they are in good standing. Students on probation at their resident campus may apply for admission as transfer students to another campus in the system, subject to that institution's policy and space availability. A complete application is required, including fee, all official transcripts, and test score reports.

Visitors Within CSU. Students enrolled at any California State University or College may transfer temporarily to another CSU campus in visitor status, if they have completed twelve units with a 2.0 grade point average at the home campus, are in good standing, and are eligible to register in continuing status. Visitor transfers are approved for one term only and are subject to space availability and enrollment priority policies at the host campus. Enrollment as visitor transfers may be repeated after re-enrollment at the home campus. This opportunity may be particularly valuable to students whose educational progress can be enhanced by attending a full summer quarter at Cal Poly Pomona. Concurrent enrollment (see below) is not permitted during visitor status. Visitor applica-

tions may be obtained from the Records Office.

Concurrent Enrollment Within CSU

Students enrolled in any California State University or College may enroll concurrently at another CSU campus if they have completed twelve units at the home campus with a 2.0 grade point average and are in good standing. Concurrent enrollment is approved for a specific term, subject to space availability and registration priority policies at the host campus. Because of overlap in academic terms of campuses on semester and quarter calendars, concurrent enrollment is subject to combinations and conditions described in the concurrent enrollment application forms available from the Admissions and Records Office.

High School Students

Students still enrolled in high school will be considered for enrollment in certain special programs if recommended by the principal and the appropriate campus department chair and if preparation is equivalent to that required of eligible California high school graduates. Such admission is only for a given program and does not constitute the right to continued enrollment. For information on this program please contact Ms. Vicki K. Roth (714-598-4821).

Early Admission Program

California State Polytechnic University will recognize outstanding academic achievement (3.75 GPA or higher) of high school students by issuing an early admissions commitment to such applicants conditional upon the earning of the high school diploma or its equivalent.

Details about the Early Admission Program may be obtained from Ms. Vicki J. Roth (714-598-4821).

DETERMINATION OF RESIDENCE FOR NONRESIDENT TUITION PURPOSES

The campus Admissions Office determines the residence status of all new and returning students for nonresident tuition purposes. Responses to items 29-45 on the Application for Admission and, if necessary, other evidence furnished by the student are used in making this determination. A student who fails to submit adequate information to establish a right to classification as a California resident will be classified as a nonresident.

The following statement of the rules regarding residency determination for nonresident tuition purposes is not a complete discussion of the law, but a summary of the principal rules and their exceptions. The law governing residence determination for tuition purposes by the The California State University and Colleges is found in *Education Code* Sections 68000-68090, 90403, 89705-89707.5, 68124, 68123, and 68121, and in Title 5 of the *California Administrative Code,* Article 4 (commencing with Section 41900) of Subchapter 5 of Chapter 1, Part V. A copy of the statutes and regulations is available for inspection at the campus Admissions Office.

Legal residence may be established by an adult who is physically present in the state and who, at the same time, intends to make California his or her permanent home. Steps must be taken at least one year prior to the residence determination date to show an intent to make California the permanent home with concurrent relinquishment of the prior legal residence. The steps necessary to show California residency intent will vary from case to case. Included among the steps may be registering to vote and voting in elections in California; filing resident California state income tax forms on total income; ownership of residential property or continuous occupancy or renting of an apartment on a lease basis 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 and home of record in California if one

is in the military service, etc.

The student who is within the state for educational purposes only does not gain the status of resident regardless of the length of the student's stay in California.

In general, the unmarried minor (a person under 18 years of age) derives legal residence from the minor's parents, or, in the case of permanent separation of the parents, from the parent with whom the minor maintains his or her place of abode. The residence of a minor cannot be changed by the minor or the minor's guardian, so long as the minor's parents are living.

A man or a woman may establish his or her residence; marriage is not a governing factor.

Nonresident students seeking reclassification are required by law to complete a supplemental questionnaire concerning financial independence.

The general rule is that a student must have been a California resident for at least one year immediately preceding the residence determination date in order to qualify as a "resident student" for tuition purposes. A residence determination date is set for each academic term and is the date from which residence is determined for that term. The residence determination dates for 1982–83 academic year are:

Quarter Term Campuses		**Semester Term Campuses**	
Fall	September 20	Fall	September 20
Winter	January 5	Winter (Stanislaus only)	January 5
Spring	April 1	Spring	January 25
Summer	July 1		

Questions regarding residence determination dates should be directed to the campus Admissions Office. They can give you the residence determination date for the term for which you are registering.

There are several exceptions from nonresident tuition, including:

1. Persons below the age of 19 whose parents were residents of California but who left the state while the student, who remained, was still a minor. When the minor reaches age 18, the exception continues for one year to enable the student to qualify as a resident student.
2. Persons who have been present in California with the intent of acquiring residence for more than a year before the residence determination date, and entirely self-supporting for that period of time.
3. Persons below the age of 19 who have lived with and been under the continuous direct care and control of an adult, not a parent, for the two years immediately preceding the residence determination date. Such adult must have been a California resident for the most recent year.
4. Dependent children and spouses of persons in active military service stationed in California on the residence determination date. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year. The exception, once attained, is not affected by retirement or transfer of the military person outside the state.
5. Military personnel in active service stationed in California on the residence determination date for purposes other than education at state-supported institutions of higher education. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year.
6. 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 both 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.

7. Certain credentialed, full-time employees of California school districts.
8. Full-time State University and Colleges employees and their children and spouses. This exception applies only for the minimum time required for the student to obtain California residence and maintain that residence for a year.
9. Certain exchange students.
10. 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.

Any student, following a final decision on campus on his or her residence classification, only may make written appeal to:

The California State University
Office of General Counsel
400 Golden Shore
Long Beach, California 90802

within 120 calendar days of notification of the final decision on campus of the classification. The Office of General Counsel may make a decision on the issue, or it may send the matter back to the campus for further review. Students classified incorrectly as residents or incorrectly granted an exception from nonresident tuition are subject to reclassification as nonresidents and payment of nonresident tuition in arrears. If incorrect classification results from false or concealed facts, the student is subject to discipline pursuant to Section 41301 of Title 5 of the *California Administrative Code.* Resident students who become nonresidents, and nonresident students qualifying for exceptions whose basis for so qualifying changes, must immediately notify the Admissions Office. Applications for a change in classification with respect to a previous term are not accepted.

The student is cautioned that this summation of rules regarding residency determination is by no means a complete explanation of their meaning. The student should also note that changes may have been made in the rate of nonresident tuition, in the statutes, and in the regulations between the time this catalog is published and the relevant residence determination date.

SOCIAL SECURITY NUMBER

Applicants are required to include their Social Security account number in designated places on applications for admission pursuant to the authority contained in Title 5 *California Administrative Code.* Section 41201. The Social Security account number is used as a means of identifying records pertaining to the student as well as identifying the student for purposes of financial aid eligibility and disbursement and the repayment of financial aid and other debts payable to the institution.

REGISTRATION

General Procedures

This university employs an early registration plan whereby students schedule classes and pay fees approximately six to eight weeks before the beginning of a quarter. Those students who preschedule their classes will receive fee bills in the mail. Registration fees must be received in the university accounting office not later than the deadline date indicated on the fee statement.

After new students have been admitted, they will receive by mail specific instructions for scheduling classes and paying registration fees. A person who applied late or who is admitted late is not assured of classes or that an evaluation of transfer credit will be prepared before classes begin.

Registration instructions for continuing students are included in the Class Schedule issued prior to the beginning of each quarter. The Class Schedule may be purchased at the El Patio University Bookstore.

Credit for a course is given only when a student is properly registered in the university and successfully completes the course. An individual is not properly registered until all registration forms required by the registrar have been filed and fees paid. A student may not be admitted to a course unless properly registered in the university.

DUAL ENROLLMENT

A student who wishes to register at another accredited institution while in attendance at this university must file a petition for dual enrollment. No credit will be granted for work taken at a college concurrent with work at this university unless this petition has been approved in advance. Petitions are available at the records office.

MAXIMUM UNIT LOAD

The maximum number of units an undergraduate student may take in any one quarter is 20, including audited courses and approved concurrent or dual work at other colleges or universities. The normal maximum for graduate students is 16 units. Exceptions may be made upon the advance approval of a "Petition to Carry an Excess Load" by the department chair and the dean of the school in which the student is enrolled. Maximum program limits will be waived only upon presentation of evidence of the student's ability to successfully complete such a group of courses.

ENGLISH PLACEMENT EXAMINATION (EPT)

All entering freshmen and lower division students with fewer than 56 transferable semester units (84 quarter units) must take the EPT. Exceptions to this rule are listed in catalog section "Requirements for Bachelor's Degree." Students who do not take the EPT, and who are not excused from taking the examination, will not be able to enroll in any English course at the university. Students who do not take the examination within the first quarter of their enrollment will receive a hold and must register for and take the next scheduled exam or be disenrolled from the university.

ENTRY LEVEL MATHEMATICS EXAMINATION (ELM)

Effective fall 1983 there will be a system-wide requirement for an entry-level math examination. This requirement will have similar enforcement at Cal Poly Pomona as in the above EPT requirement. Students are advised to contact the Test Center, Bldg 1, Room 106 for up-to-date information on the ELM.

ADDING OR DROPPING COURSES

Students who preschedule and pay fees on time are mailed a receipt and study list shortly before classes begin each quarter. Any change in the original schedule must be made by filing in the records office a properly completed change of program form on

or before the appropriate deadline published in the academic calendar. Students who do not drop a scheduled class which they are not attending are subject to receiving a failing grade. Change of program forms are available from the student's major department office. (See also the section regarding refund of fees.) Courses may be added or sections changed through the 8th class day. Courses may be dropped without penalty (no entry on permanent record) through the 5th class day. After this date and through the 15th class day courses may be dropped with a grade of W recorded automatically. After this 15th class day up to the beginning of the last three weeks of instruction, students may drop a course only for serious and compelling reasons. Permission to drop during this time period will be granted only with the approval of the professor and the student's major department chair and school dean. All requests for permission to drop under these circumstances and all approvals will be made in writing on a petition to drop. A statement of the reason(s) for dropping is required. For a course dropped during this period, a W grade will automatically be recorded.

Dropping of courses shall not be permitted during the final three weeks of instruction except in cases in which the reason is due to circumstances clearly beyond the student's control. Such drops will be approved for: emotional disturbance which requires professional consultation (verification may be required); serious illness or accident resulting in considerable loss of time (verification is required); and/or financial difficulty or other personal problems of a serious nature which require withdrawal from the university or reduction in load (verification is required for reduction in load).

Failure in a course is not an acceptable reason for withdrawing from class during the last 15 days of instruction. Ordinarily dropping of courses during this time period will involve total withdrawal from the university. The instructor will assign a grade of A-F or I or W for a course dropped during the last three weeks of instruction. A student may improve the GPA, as a consequence of his receiving an F, by formally repeating the course (See Repeated Course Policy).

AUDITING COURSES

Auditing a course is attending a class for no credit. **A student must be registered and must have paid fees in order to audit a course.** Audited courses must be included on the student's official program card, and they are designated by AU beside the course unit listing. A special audit card must also be signed by the instructor and returned to the records office by the appropriate deadline. No exceptions to this policy are permitted.

Enrollment in any course as an auditor shall be permitted only after students otherwise eligible to enroll in the course on a credit basis have had an opportunity to do so. Auditors are subject to the same fee structure as credit students and regular class attendance is expected. Once enrolled as an auditor, a student may not change to credit status unless such a Change of Program form is filed on or before the last day to add classes. The deadline for changing from credit to audit is the 15th day of instruction. The materials and service fee is determined on the basis of the total units of both credit and audit courses in which the student is enrolled.

HOLDING OF RECORDS

Student records may be placed on a hold status because of financial or other obligations to the university. While the student's records are on hold, registration will not be allowed, nor will transcripts of credits be released. Records will be held until the obligation is cleared to the satisfaction of the office or department instituting the hold. Legal authority for these actions is cited in Sections 42380 and 42381 of *Title 5* of the *California Administrative Code.*

HONORABLE DISMISSAL

Honorable dismissal automatically will be noted on the transcript of each student who graduates or withdraws from the university, unless disqualified because of misconduct or due to academic reasons.

TRANSFER TO OTHER INSTITUTIONS

A student who plans to transfer from this university to another college or university, should, at the earliest possible date, request that a transcript of record be forwarded by the registrar's office (see Fees and Expenses Schedule for charges) to the new institution. Evaluation of transcripts will be made by the new institution.

LEAVE OF ABSENCE (Planned Educational Leave)

When a student finds it necessary to interrupt progress toward a degree for a reason related to the educational objective and acceptable to the appropriate university authorities, the student may be granted a leave of absence. A student on leave of absence may, upon return from the leave, continue in the same program that student had prior to the leave, and the student retains the right to elect requirements in effect at the time of entrance or reentrance into the curriculum.

A leave of absence will be granted when the student has filed an approved petition with the Registrar. The leave petition, which must be approved by the department chairman, or graduate coordinator and school dean, shall specify the reasons for the leave and the duration of the leave. A student granted a leave of absence has a commitment from the university to be readmitted. This commitment must be validated by a written notice of return from leave for the quarter of return specified in the leave application submitted to the Registrar no later than two weeks prior to the pre-scheduling of continuing students for that quarter.

The reason for requesting a leave must be stated completely and clearly. Approval will depend upon the significance of the leave in furthering the student's educational objective. It is the student's responsibility to demonstrate the significant relationship between the leave of absence and the progress toward the educational objective. Leaves may be granted for a maximum of two years or eight consecutive quarters. A request for leave of absence must be filed prior to the period of absence. Retroactive leave requests will not be approved.

Failure to return from leave as specified in the approved petition will be considered withdrawal from the university. Under such circumstances, re-enrollment will require a full application for readmission under the same circumstances as any new or returning applicant including enrollment in the curriculum in effect at the time of reenrollment.

Students may stop-out for one quarter without filing for a leave of absence. (Summer quarter does not count.)

WITHDRAWAL FROM THE UNIVERSITY

Students who desire to withdraw from the university for the quarter because of personal, academic or other problems should consult with, and obtain forms from the Counseling Center. After official clearances are received by the student, the withdrawal application is submitted to the records office. Students leaving the university who do not officially withdraw are subject to failing grades in their classes. The grading policy for students who withdraw from the university after the 5th day of classes is the same as for students who drop courses after this date (see Adding or Dropping Courses).

REFUNDS

Any student who withdraws from the university or drops to 6 units or less before the end of the 15th calendar day of the quarter is entitled to a refund of a portion of registration fees paid. A nonresident or foreign student who withdraws from the university or who drops units during the first four weeks of a quarter is entitled to a refund of a portion of tuition paid. A student must file an application for a refund with the records office at the time of withdrawal or dropping of units to be eligible for a refund. Applications for refund cannot be accepted at a later date.

ENROLLMENT PRIORITIES

Departments with high enrollments may assign priorities to students wishing to enroll in both undergraduate and graduate-level courses. In graduate classes, candidates for a master's degree who are in the last quarter of residence have first priority; other classified graduate and post-baccalaureate students, degree or credential, have second priority; conditional and unclassified graduate and postbaccalaureate students have third priority. Nonobjective unclassified graduate students are admitted on a space-available basis.*

CHANGE OF MAJOR

Students have the opportunity, upon determining that they are pursuing a course of study for which they have no aptitude or in which they are not interested, to change to another major. In such cases, students should consult their adviser and the Counseling Center for assistance in making the change. Students enrolled under certain laws must obtain approval by the Veterans Administration before a change can be made.

Transfer from one major to another does not in any way change the student's scholastic standing. It does, however, constitute a break in continuous enrollment, and as such may impact general education and other graduation/degree requirements.

Students requesting a change of major into an impacted program must file the required change of major petition no later than the last day of the initial application period for the quarter of the desired change. Acceptance into the new program will be on the same basis as for new applicants. This policy is subject to further change and students are advised to check with the Registrar's office for up-to-date information.

CURRICULUM DEVIATION

Although the university has specified a program of courses for each major, under certain conditions, a student may be permitted to deviate from the established curriculum. Information regarding requests to deviate from the curriculum may be obtained from the student's adviser and the Evaluations Office.

ELECTION OF REQUIREMENTS

A student in continuous attendance and continuing in the same curriculum may elect to meet the graduation requirements in effect either at the time of entering the curriculum or at the time of graduation. Substitutions for discontinued courses not taken by the student may be authorized or required by the student's major department.

In the case of those transferring from a community college in California, the student may elect to continue in the curriculum in effect at the time of initial enrollment in the community college if the student has been in continuous enrollment. Such requests must be submitted in writing to the evaluations office.

Students granted a leave of absence may continue in the same degree program they had before leaving, provided they comply with leave of absence regulations.

FULL-TIME EQUIVALENT AND FULL-TIME STUDENT

Enrollment in the California State University system is measured in full-time equivalent (FTE) students. One FTE is the equivalent of fifteen units of student course credit taken by one or more students. One FTE could represent one student carrying fifteen course-units, three students each carrying five course-units, five students each carrying three course-units, or any other student/course-unit combinations the product of which equals fifteen course-units. The university's FTE enrollment is the total course-units taken by all students divided by fifteen.

FTE is not related to full-time student status. An undergraduate student is considered full time for such purposes as veterans' benefits and other financial aids when enrolled for twelve units of credit. A full-time student is not necessarily a full-time equivalent (FTE)

* In undergraduate classes priority will be given to graduating seniors.

student. Graduate and postbaccalaureate students are considered as full time for most purposes, such as veteran's benefits, when they are enrolled for eight units.

PRIVACY RIGHTS OF STUDENTS IN EDUCATION RECORDS

The federal Family Educational Rights and Privacy Act of 1974 (20 U.S.C. 1232g) and regulations adopted thereunder (45 C.F.R. 99) and Califonria Education Code Section 67100 et seq., set out requirements designed to protect the privacy of students concerning their records maintained by the campus. Specifically, the statute and regulations govern 1) access to student records maintained by the campus, and 2) the release of such records. In brief, the law provides that the campus must provide students access to official records directly related to the student and an opportunity for a hearing to challenge such records on the grounds that they are inaccurate, misleading or otherwise inappropriate; the right to a hearing under the law does not include any right to challenge the appropriateness of a grade as determined by the instructor. The law generally requires that written consent of the student be received before releasing personally identifiable data about the student from records to other than a specified list of exceptions. The institution has adopted a set of policies and procedures concerning implementation of the statutes and the regulations on the campus. Copies of these policies and procedures may be obtained at the Dean of Students Office. Among the types of information included in the campus statement of policies and procedures are: 1) the types of student records and the information contained therein; 2) the official responsible for the maintenance of each type of record; 3) the location of access lists which indicate persons requesting or receiving information from the record; 4) policies for reviewing and expunging records; 5) the access rights of students; 6) the procedures for challenging the content of student records; 7) the cost which will be charged for reproducing copies of records; and 8) the right of the student to file a complaint with the Department of Education. An office and review board have been established by the Department to investigate and adjudicate violations and complaints. The office designated for this purpose is: The Family Educational Rights and Privacy Act Office (FERPA), U.S. Department of Education, 330 "C" Street, Room 4511, Washington, D.C. 20202.

The campus is authorized under the Act to release "directory information" concerning students. "Directory information" includes the student's name, address, telephone listing, date and place of birth, major field of study, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, degrees and awards received, and the most recent previous educational agency or institution attended by the student.* The designated information is subject to release by the campus at any time unless the campus has received prior written objection from the student specifying information which the student requests not be released. Written objections should be sent to Henry House, Dean of Students.

The campus is authorized to provide access to student records to campus officials and employees who have legitimate educational interests in such access. These persons are those who have responsibilities in connection with the campus' academic, administrative or service functions and who have reason for using student records connected with their campus or other related academic responsibilities.

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* Directory information at Cal Poly Pomona does *not* provide the student's address, telephone listing, or date and place of birth.

EXPENSES AND HOUSING

SCHEDULE OF FEES, 1982–83 (Up-to-date information available from Office of Admissions and Records)

Legal residents of California are not charged tuition. The following reflects applicable fees and nonresident tuition for both the quarter and the semester systems. (Fees are subject to change without advance notice.)

All Students

Application Fee (nonrefundable), payable by check or money order at time application is made: $30

Student Services Fee for all campuses except California State College, Stanislaus:

	Semester	Quarter	Academic Year
All students	$108	$72	$216

California State College, Stanislaus

	Fall & Spring Term	Winter Term	Academic Year
All students	$96	$24	$216

State University Fee for all campuses except California State College, Stanislaus:

Units	Semester	Quarter	Academic Year
0 to 5.9	$24	$16	$48
6.0 or more	$75	$50	$150

California State College, Stanislaus:

Units	Fall & Spring Term	Winter Term	Academic Year
0 to 5.9	$18	$12	$48
6.0 or more	$69	$12	$150

Nonresident Students (U.S. and foreign)

Nonresident Tuition (in addition to other fees charged all students) for all campuses:

	Quarter	Semester
Charge Per Unit	$70	$105

The fee for California State College, Stanislaus will be the same as the semester unit charge, $105.

The total fee paid per term will be determined by the number of units taken, including those in excess of fifteen.

No fees of any kind shall be required of or collected from those individuals who qualify for such exemption under the provisions of the Alan Pattee Scholarship Act.

ALAN PATTEE SCHOLARSHIPS

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, are not charged fees or tuition of any kind at any California State University campus, according to the Alan Pattee Scholarship Act, *Education Code Section 68121. Students qualifying for these benefits are known as Alan Pattee scholars. For further information, contact the admissions/registrar's office, which determines eligibility.*

THE STUDENT SERVICES FEE

The student services fee provides financing for the following student services programs not covered by state funding:

1) Social and Cultural Development Activities: Provides for the coordination of various student activities, student organizations, student government and cultural programs.
2) Counseling: Includes the cost of counselors' salaries and clerical support plus operating expenses and equipment.
3) Testing: Covers the cost of test officers, psychometrists, clerical support, operating expenses and equipment.
4) Placement: Provides career information to students and faculty for academic program planning and employment information to graduates and students.
5) Financial Aids Administration: Includes the cost of the counseling and business services provided in connection with the financial aid program.
6) Health Services: Provides health services to students and covers the cost of salaries of medical officers and nurses plus related clerical and technical personnel as well as operating expenses and equipment.
7) Housing: Includes the cost of personnel providing student housing information and monitoring housing services.
8) Student Services Administration: Covers 50% of the cost of the Dean of Students Office which has responsibility for the overall administration of student services.

MISCELLANEOUS FEES (Subject to change)

Application to the university (charged of all applicants—payable by check or money order at time of applying—*nonrefundable*)	$30.00
Check returned for any cause	10.00
Conference, Short Course or Institute, per person	Estimated cost
Course credit by special examination (per unit)	5.00/unit, $25 maximum
Failure to meet administratively required appointment or time limit	10.00
Document Replacement	1.00
Graduation (not a state fee)	
Bachelor's degree	10.00
Master's degree	10.00
Health facility fee	2.00
I.D. card (nonrefundable)	1.50
Late registration	25.00
Library	See schedule in library
Parking fee (per quarter)	
Automobiles	15.00
Motorcyles/Mopeds	3.75
Transcript of record	4.00
Associated Students, Inc. membership fee (not a state fee)	
Fall quarter	13.00
Winter, Spring, quarter, each	8.00
Summar quarter	5.00
University Union fee (not a state fee)	
Fall quarter	10.00
Winter, Spring quarter, each	7.00
Summer quarter	5.00
Instructionally Related Activities Fee:	
Fall quarter	4.00
Winter quarter	3.00
Spring quarter	3.00

Education Code, Section 23801
Education Code, Section 23805
Sponsored Program Fee per quarter 100.00
(for certain foreign students only)

Dependent on the time of withdrawal from the university, a student may be entitled to a partial refund of fees if applied for at the time of withdrawal. (See section on Withdrawal from the University.)

PROCEDURES FOR THE ESTABLISHMENT OR ABOLISHMENT OF A STUDENT BODY FEE

The law governing The California State University provides that a student body fee may be established by student referendum with the approval of ⅔ of those students voting. The Student Body Fee was established at California State Polytechnic University, by student referendum on May 9, 1952. The same fee can be abolished by a similar ⅔ approval of students voting on a referendum called for by a petition signed by 10% of the regularly enrolled students. (Education Code, Section 89300.) The level of the fee is set by the Chancellor. An increase in the student body fee may be approved by the Chancellor only following a referendum on the fee. Student body fees support a variety of cultural and recreational programs, child care centers, and special student support programs.

REFUND OF FEES

Details concerning fees which may be refunded, the circumstances under which fees may be refunded, and the appropriate procedure to be followed in seeking refunds may be obtained by consulting Section 41803 (parking fees), 41913 (nonresident tuition), 42019 (housing charges), and 41802 (all other fees) of Title 5, California Administrative Code. In all cases it is important to act quickly in applying for a refund. Information concerning any aspect of the refund of fees may be obtained from the Dean of Students Office.

Nonresident Tuition Fee Waiver

California school district employees who are not yet legal residents of California may be exempted from the nonresident tuition fee if they are provisionally certificated, employed full time by a school district in a position requiring certification, and if they are working toward fulfilling regular California credential requirements or completing a fifth year of study.

Children or spouses of The California State University employees are also eligible to apply for exemption from the nonresident fee.

Expenses (Estimated)

Estimated expenses for a California resident student living in a campus residence hall are $650 per quarter exclusive of personal expenses.

A student enrolling under the auspices of an agency supplying educational assistance should check in advance with the agency representative regarding payment of fees and/or costs.

The total cost for students living away from home will vary. However, typical costs will amount to approximately $3,500 for a three-quarter school year, *excluding* personal expenses.

Total expenses for nonresident and foreign students will be higher, as they will include tuition fees not required of legal California resident students.

Typical On-Campus Expenses for One Quarter
Associated Students, Inc., membership and University Union fees
Fall Quarter $20
(Winter & Spring—$12, Summer—$10)

Student Services fee	72
Room and board (19 meals per week—1982–83)	892*
Books and supplies (estimated)	100
Parking	15*
Facility Fee	2
Instructionally Related Fee—Fall	4
Winter/Spring	3

* Subject to change

Provision should be made for personal expenses which average $250 per quarter.

The student majoring in one of the environmental design disciplines should be prepared for expenditures that are somewhat greater than average. Experience has indicated that students spend from $150 to $250 per quarter for materials, equipment, and supplies during their initial year as environmental design students.

Debts Owed to the Institution

Should a student or former student fail to pay a debt owed to the institution, the institution may "withhold permission to register, to use facilities for which a fee is authorized to be charged, to receive services, materials, food or merchandise or any combination of the above from any person owing a debt" until the debt is paid (see Title 5, *California Administrative Code,* Sections 42380 and 42381). For example, the institution may withhold permission to receive official transcripts of grades from any person owing a debt. If a student believes that he or she does not owe all or part of an unpaid obligation, the student should contact the campus business office. The business office, or another office on campus to which the student may be referred by the business office, will review the pertinent information, including information the student may wish to present, and will advise the student of its conclusions with respect to the debt.

Housing

The university on-campus residence program emphasizes educational activity as part of the total living experience. Concern for the student's personal, social, and intellectual development has resulted in a vigorous residence hall program based on student interests. Wing and hall governments, social events, cultural and recreational efforts and community living complement the academic schedule to create a living and learning environment.

Each of the six air-conditioned halls on the campus accommodates about 200 students in comfortable double rooms. Recreation and lounge facilities are provided for each hall, as are convenient laundry facilities, refreshment vending machines, kitchenettes, and ironing and study rooms. Student rooms are furnished with beds, dressers, closets, bookcases, desks and chairs. Students supply their own pillows, blankets, towels, sheets, study lamps and room decorations. Dining facilities located in nearby Sycamore Canyon provide for outdoor or indoor dining. Breakfast, lunch, and dinner are offered weekdays with brunch and dinner on Saturday and Sunday.

All new undergraduate students should automatically receive a housing application in the "space reservation letter" sent by the admissions office. Housing applications should be returned to the housing office immediately if on-campus housing is desired. However, any interested undergraduate student may request a housing application at any time. Students must be admitted to the university in order to receive a license (contract), therefore, early admission is of great importance. Contracts issued for the academic year provide for both room and board. Residence hall fees were $2,676 for the 1982-83 academic year and are expected to increase. Payments may be made in periodic installments in accordance with the schedule available from the housing office. Housing costs and housing regulations are subject to change. Up-to-date information is available from the Campus Housing Office (La Cienega Center).

Off-Campus Housing

Privately-owned and operated off-campus housing is available for both men and women students. The university does not inspect or supervise these facilities. Inquiries about off-campus housing should be made in person at the Housing Office. An off-campus brochure shows apartment complexes located in the community area. A bulletin board lists current vacancies, i.e., rooms in homes, students wishing roommates and current available rentals.

AVERAGE ANNUAL COSTS AND SOURCES OF FUNDS PER FULL-TIME EQUIVALENT STUDENT

The 19 campuses and the Chancellor's Office of The California State University are financed primarily through funding provided by the taxpayers of California. Including capital outlay, the CSU 1982/83 budget totals approximately $1.20 billion. Approximately $1.18 billion of the $1.20 billion total has been budgeted to provide support for a projected 239,900 full-time equivalent (FTE*) students. Thus, excluding costs which relate to capital outlay and the Energy and Resources Fund (e.g., building amortization), the average cost per FTE student is $4,947 per year. Of this amount, the average student pays $710. Included in this average student payment calculation is the amount paid by nonresident students. The remaining $4,237 in costs is funded by state and federal taxes.

Averages do not fit all students alike or even any specific student. To arrive at an average figure that is meaningful, the costs outlined above exclude "user fees" for living expenses, housing, and parking as well as costs for extension and summer session work. Computations are based on full-time equivalent students, not individuals, and costs are prorated by system totals, not by campus. The average costs for a full-time equivalent student in the system are depicted in the following chart:

TOTAL 1982/83 CSU BUDGET
(PROJECTED ENROLLMENT: 239,900 FTE)

Funding Source	*Amount*	*Average Cost Per Student (FTE)**	*Percentage*
State Approp. (Support)	$970,118,453	$4,044	81.7%
Student Charges	170,233,339	710**	14.4%
Federal (Financial Aids)	46,337,429	193	3.9%
State Funding (Capital Outlay and Energy and Resources Fund)	18,803,000	***	***
Total	$1,205,492,221	$4,947	100.0%

* For budgetary purposes, full-time equivalent (FTE) translates total head count into total academic student load. The term assumes that a full-time student in The California State University is enrolled for 15 units of academic credit. Some students enroll for more than 15 units; some students enroll for fewer than 15 units.

** The average costs paid by a student include the student services fee, health facilities fee, college union fee, student body fee, application fee, catalog fee, State University Emergency Fee, and the nonresident tuition. This amount is derived by taking the total of all student fees and dividing by the total full-time equivalent student enrollment. Individual students may pay more or less than $710 depending on whether they are part-time, full-time, resident or nonresident students.

*** Average Cost Per Student (FTE) and Percentage columns are not calculated for this funding source. The estimated replacement cost of all the system's permanent facilities and equipment on the 19 campuses is currently valued at $4.1 billion, excluding the cost of land.

SERVICES

Health and Medical

Medical services are designed to provide, on an outpatient basis, the services usually rendered by the family physician. Any specialist care or hospitalization is at the student's expense unless student insurance is purchased at the time of enrollment (or the student is covered by another private insurance plan or under the parents' policy). All enrollees may utilize the health services daily, Monday through Friday, between 8:00 A.M. and 5:00 P.M., except holidays. In addition, evening services are provided for students enrolled in evening classes. These consist of full services on Tuesday evening from 5:00 P.M. to 7:00 P.M. with a physician, nurse, laboratory technician, and stenographer on duty. Limited evening services are provided from 5:00 P.M. to 7:00 P.M., Monday through Thursday, with a registered nurse and receptionist on duty.

Counseling/Test Center

Professional counselors are available in the counseling center and other locations on campus for the purpose of providing students with the opportunity for confidential discussion about personal, social, vocational or academic problems. Both individual and group counseling are utilized. Counseling emphasizes the importance of developing self-confidence, self-management skills and the ability to achieve meaningful interaction with others as a basis for solving problems. Counselors are available for emergencies when the center is closed.

The center conducts a career education program in cooperation with the Career Center. The Test Center provides diagnostic, personality and vocational tests when these seem appropriate to the counseling function. The Test Center also provides up-to-date information on the English Placement Test (EPT) and the Graduation Writing Test (GWT) requirement. Sign-up for these tests is also done in this center.

Academic and occupational guidance is provided by a faculty advisor in the student's major department. Personal and social concerns identified by this advsor and other members of the faculty are referred to the professional staff in the counseling center.

Orientation

Orientation programs for beginning students are conducted prior to the start of each quarter. In addition, special programs for new freshmen and transfer students entering in the fall quarter are held during the summer which provides an opportunity for new students to schedule their classes for fall quarter. These programs also offer students an introduction to the campus, to student services, and to the academic program related to their major. Every effort is made to provide new students with information and advice which will facilitate a smooth and effective beginning at Cal Poly. The orientation programs are directed and coordinated by the counseling center.

Academic Advising

Academic advising is a primary responsibility of faculty and is integrally related to the educational process. It is the responsibility of each student to know and meet graduation and other requirements and to make every reasonable effort to obtain adequate academic advising. Frequent advisor contact will help to ensure the student has current academic information and is making adequate progress toward educational goals.

The general functions of university student advising include: Providing students with information on policies, procedures and programs of the university; assisting students in choosing educational and career objectives commensurate with their interests and abilities; assisting students in exploring the possible short- and long-range consequences of their choices; and making students aware of the wide range of services and educational opportunities that may be pertinent to their educational objectives at this university.

The specific type of advising program adopted by the academic units varies by school a by department. Students are advised to check with their major department office to familiarize themselves with the advising program adopted by their department.

The University Advising Center

The University Advising Center serves students; faculty; and school, department, and program advising coordinators. The Center is located in the Duplex (Building 95). For hours and special services call (714) 598-0287. Among its duties, the Center gathers and disseminates appropriate academic advising materials to assist school, department, and program advising coordinators; serves as the central source for information on student academic regulations (general education, basic academic rules and regulations governing student conduct, etc.); acts as a reference service and responds to questions from faculty and school, department, and program advising coordinators; acts as a referral for students needing to see faculty advisors or in need of other available campus services; helps students to locate their academic advisors; in cooperation with academic units, coordinates advising and counseling services for students on academic probation or subject to disqualification; provides academic advising orientation, training, and development for faculty members, advising coordinators, and student peer advisors; assists in Student Orientation activities.

Center for Health Science Advising

The Center provides advising for students who are interested in veterinary medicine, medicine, dentistry, podiatry and other health related areas. This service is available to all students regardless of major.

The Center advises students regarding curriculum, grade point average, activities and employment, admissions tests, the application, letters of recommendation and the interview.

Drs. J. E. Dimitman and L. M. Knill, in the Biological Science Department, School of Science, advise pre-veterinarian students (additional advising is available in the School of Agriculture) and Dr. David Steele (Biological Sciences) all others. Those majoring in Chemistry should see Dr. Victor Abegg in The Department of Chemistry, School of Sciences.

Veterans Affairs

The university is approved for the training of veterans of the military services and their dependents who qualify under educational assistance programs established by the state and federal governments.

Authorization for training under all federal laws must be obtained from the Veterans Administration through its regional office at 11000 Wilshire Boulevard, Los Angeles, California 90024. Veterans with no prior training under the G.I. bills are urged to request their letters of eligibility at least two months before enrolling. Those who are transferring from another school should submit their transfer requests at least one month before entering.

Disabled Student Program

Students who have a physical or emotional disability are eligible for services of the Disabled Student Center. Some of the services offered are orientation to the campus, counseling, interpreters for the hearing impaired, note takers, elevator key cards, liaison with off-campus rehabilitation agencies, and assistance with registration and parking. The center also has various equipment available to aid disabled students in their academic pursuits such as a Visualtek print magnifier, talking calculator and two communication systems for the hearing impaired. The university campus and classrooms are accessible to disabled students.

For further information regarding services for the disabled contact the Director of Disabled Students Services in the University Library (Building #15), Room 110.

CAREER PLACEMENT INFORMATION

The campus may furnish, upon request, information concerning the subsequent employment of students who graduate from programs or courses of study which have the purpose of preparing students for a particular career field. This information includes data concerning average starting salary and the percentage of previously enrolled students who obtained employment. The information provided may include data collected from either graduates of the campus or graduates of all campuses in The California State University. Copies of published information are available from the Director of the Career Center.

The Career Center

A centralized career center is available for all students and graduates of the University.

The center assists students in the development of their career goals and students who have not yet chosen an academic major. The center has an extensive career resources planning library that has written and audio-visual career information as well as a computerized career guidance system. The System of Interactive Guidance and Information (SIGI) helps students rank ten work-related values, locate occupations that meet those values, and compare occupations. It also assists students in planning for different occupations, and teaches a decision-making process. Students who are unsure of their major or career plans are encouraged to take the Career and Personal exploration class. For a description of this course (CPU 100) see the catalog section University Programs.

STUDENT EMPLOYMENT

The student employment office of the center assists students in finding part-time, temporary, summer, vacation, cooperative education, and internship experiences. Work experiences are located on and off the campus. Cooperative education and internship planning and placement are implemented in conjunction with faculty coordinators in the various university majors.

CAREER EMPLOYMENT

The center also assists students and alumni in obtaining career positions. An extensive program of workshops, relating to career choice and the job hunting process, is offered each quarter. An extensive on-campus recruiting program is conducted, as nearly 600 industrial, business, and federal representatives visit the campus to interview graduating students. The career search library has an extensive collection of directories, job listings, and other materials for the job hunter.

Every candidate for a teaching credential registers with the center before or during the quarter prior to completion of the credential requirements. Registration includes preparation of a résumé and the assembling of references for the professional file.

FINANCIAL AID

Further information regarding the following is available from the Director of Financial Aid, California State Polytechnic University, Pomona, 3801 West Temple Avenue, Pomona, California 91768, (714) 598-4284.

Cal Poly offers a variety of financial aid programs which are funded by government and private sources. These include grants, work-study opportunities, scholarships, and loans which are interest free while you are enrolled for at least a half-time load.

Detailed information and professional financial counseling as well as complete application instructions may be obtained from the financial aid office, which has been staffed with fully trained professional counselors to assist you with financing your education.

The application period for new and continuing students opens December 1. Priority will be given to those students who mail their application by March 1 and *have a completed application on file* in the Financial Aid Office by April 15. A completed application includes all supporting documentation.

The student will be required to file a Student Aid Application for California. A dependent student is required to file a copy of his or her parents' Federal Income Tax Form 1040 and if the student earned sufficient income to file his or her own tax statement with the U.S. government, a copy of the Federal Income Tax Form 1040 must be submitted with the application for financial aid. The independent student is required to file a copy of the Federal Income Tax Form 1040 or in the case of a married student a copy of the joint Federal Income Tax Form 1040.

SCHOLARSHIP APPLICANTS ONLY

In any scholarship competition, a legible, complete and well-thought-out application will always project a more favorable image to the selection committee. In deciding just which questions to put on the application and those which should be answered, consideration was given to the variety of requirements for various scholarships as well as to the questions asked by committee members when selecting winners. In other words, the more complete your application, the better your chance to be selected.

All scholarship applicants should complete the scholarship questionnaire, the Student Aid Application for California, and obtain two (2) letters of recommendation. Deadlines for the scholarships are March 1 unless otherwise indicated by the donor.

Types of Financial Aid (Subject to Change)

1. SCHOLARSHIPS
   A. University Scholarships—Vary from $200 to $2,000 on an annual basis provided by various donors. Most are limited to upper classmen who have completed at least one quarter at Cal Poly. Information on each scholarship is available from the Financial Aid Office.
   B. Noninstitutional Scholarships—A variety of business and service organizations provide scholarships with the sponsor handling the application, selection, and disbursement procedures. Announcements of such scholarships will be posted on the bulletin board outside the Financial Aid Office. Listings for available scholarships frequently appear in the campus newspaper.
2. GRANTS
   Grants are funds that do not have to be repaid. The amount a student receives is based on analyzed need as determined at the time of the financial aid interview.
   A. Pell Grant Program—Federal entitlements, based on need available to undergraduates. Application forms may be obtained from your school counselor or the campus Financial Aid Office, as well as from the post offices, libraries and banks.
   B. Supplemental Educational Opportunity Grants—Federal grants restricted to undergraduates with exceptional financial need.
   C. State University Grant—State funds awarded to students enrolled in 6 units or more who are residents of the State of California. The award is based on need. The maximum award is $100 per academic year. Undergraduate and graduate students are eligible to receive this aid.
   D. State E.O.P. Grants—Funds provided by the State on a similar basis as the Supplemental Educational Opportunity Grants except that the maximum amount is $1,000 and is restricted to students formally enrolled in the Educational Opportunity Program.
   E. California Educational Opportunity Grants—Administered by the California State Student Aid. Cal Grant (A) recipients receive an amount equal to the tuition (fees) at the institution of higher education which they attend. Cal Grant (B) recipients

receive a stipend for direct educational expenses in addition to tuition (fees). The deadline for application is February 1 for the following academic year.

3. EDUCATIONAL LOANS
   Long-term educational loans are available through various FEDERAL Programs with interest and repayment deferred until after graduation and during military service or continued full-time schooling. Applicants must be U.S. citizens or permanent residents.
   A. National Direct Student Loans—Funded by the Federal government with the student award based on need and availability of funds. Borrowers may have a portion of the principle cancelled for each year of qualifying teaching and/or military service up to certain maximums. Five (5) percent interest is charged and payments begin six (6) months after graduation.
   B. Guaranteed Student Loans—Funded by private lending agencies with guarantees provided by the Federal government. Nine (9) percent interest is charged and minimum monthly payments to begin six (6) months after graduation.
   C. California Guaranteed Student Loan (CGSL)—Low interest loan (9%) available to students through eligible California lenders. An insurance premium to be collected in total at the time the loan is disbursed and is calculated at a rate of one (1) percent for each year of the anticipated academic program in which the student has enrolled plus a 12-month period. Minimum monthly payments to begin after dropping below half-time status. The loans are obtained directly from commercial lenders or authorized educational institutions and are guaranteed by the California Student Aid Commission and reinsured by the Federal Government. A 5% loan origination fee is charged by the lender. A need analysis is also required.
4. EMPLOYMENT
   A. College Work-Study Program—This program is funded by the Federal government to help create on and off-campus jobs for students. Qualified students may work for the University or an approved off-campus agency for not more than 20 hours per week. Apply through the Financial Aid Office.
   B. Student Employment Office—Assistance in seeking part-time, temporary, summer, vocation, cooperative education and internship experiences is provided by the student employment office of the Career Planning and Placement Center. Referals to available positions are available after students have been admitted.
5. SHORT TERM LOANS
   Loans up to the exact amount of tuition and fees or $198, whichever is greater, may normally be borrowed for directly related educational expenses which cannot otherwise be met due to an unexpected situation. Repayment is scheduled in 30 to 90 days.

Institutional and Financial Assistance Information

The following information concerning student financial assistance may be obtained from the Office of Financial Aid, building 1, room 308, (714) 598-4284.

1. Student financial assistance programs available to students who enroll at Cal Poly Pomona;
2. The method by which such assistance is distributed among student recipients who enroll at Cal Poly Pomona.
3. The means, including forms, by which application for student financial assistance is made; the requirement for accurately preparing such applications; and the review standards employed to make awards for student financial assistance; and
4. The rights and responsibilities of students receiving financial assistance.
5. The standards which the student must maintain in order to be considered to be making satisfactory progress for the purpose of establishing and maintaining eligibility for financial assistance.

The following information concerning the cost of attending Cal Poly Pomona is available from the admissions officer, building 1, room 105, (714) 598-4295.

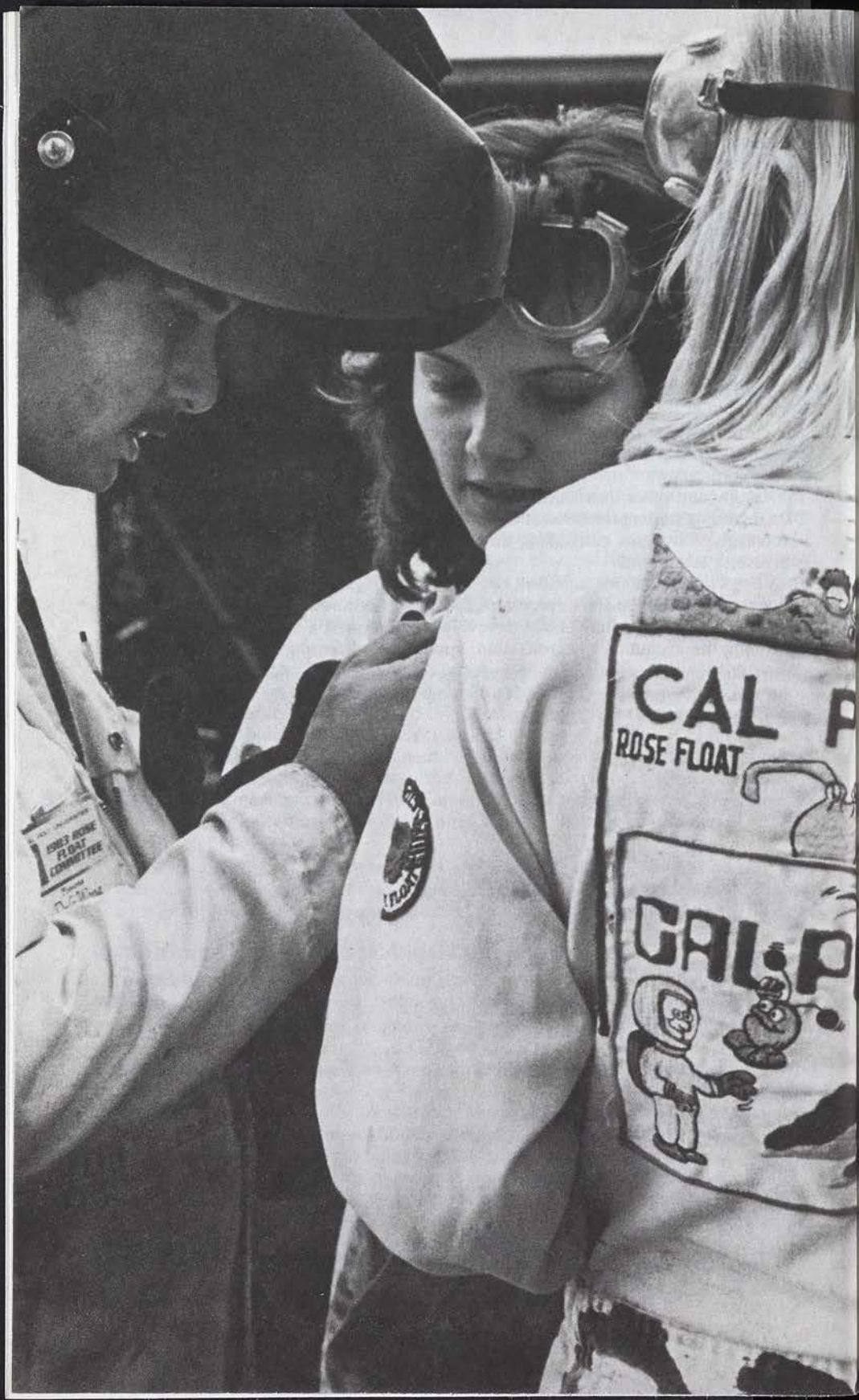
1. Fees and Tuition (where applicable);
2. Estimated costs of books and supplies;
3. Estimates of typical student room and board costs or typical community costs; and
4. Any additional costs of the program in which the student is enrolled or expresses a specific interest.

Information concerning the refund policy of Cal Poly Pomona for the return of unearned tuition and fees or other refundable portions of costs is available from the registrar, building 1, room 104B, (714) 598-4056.

Information concerning the academic programs of Cal Poly Pomona may be obtained from the Dean of Instruction, Bld 1, Room 221, (714) 598-4722. This information may include:

1. The current degree programs and other educational and training programs;
2. The instructional, laboratory, and other physical plant facilities which relate to the academic program;
3. The faculty and other instructional personnel; and
4. Data regarding student retention at Cal Poly Pomona and, if available, the number and percentage of students completing the program in which the student is enrolled or expresses interest; and
5. The names of associations, agencies, or governmental bodies which accredit, approve, or license the institution and its programs, and the procedures under which any current or prospective student may obtain or review upon request a copy of the documents describing the institution's accreditation, approval, or licensing.

Information regarding special facilities and services available to handicapped students may be obtained from Ms. Carol A. Goldstein, Director, Office of Disabled Student Services, Bld. 15-110, (714) 598-4810.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STUDENT ACTIVITIES AND CONDUCT

The quality of student life at Cal Poly is reflected in the breadth of out-of-class programs and informal activities developed by students. Co-curricular activities are an integral part of the educational program, and each student is urged to participate in the life of the academic community.

Student Government and Organizations

All students are members of the Associated Students of California State Polytechnic University, Pomona, and pay a membership fee which entitles the student to full participation in the activities of the association. Membership also makes the campus newspaper, *Poly Post,* available to all students. The association develops student-sponsored programs of maximum value and interest to the university community.

The government of student affairs and responsibility for property of the associated students are vested in the student senate and executive cabinet, the members of which are elected or appointed annually. In addition, boards and committees supervise publications, athletics, finances, university union programs and *Poly Vue.* Councils of representatives of the various departmental student organizations participate in student government on behalf of each of the academic schools.

Chartered clubs and organizations involve all departments and special interests, and the opportunity exists for every student to take an active part in club life.

Offices of the ASI in the Student Development Center are housed in the Union Plaza (26), within the University Union complex. The business office of the ASI and the university union is in the University Union Building (35).

Student Religious Organizations

At Cal Poly, Pomona, there are religious clubs chartered by the Associated Students Incorporated. Several of these groups have campus ministers who serve the needs of students on campus. Religious options at Cal Poly include the Newman Club (Catholic), Hillel (Jewish), United Ministry (Interdenominational Protestant), and Latter Day Saints Student Association (Mormon).

Other religious interests are met through clubs such as: Baptist Student Union, Hebrew-Christian Fellowship, Campus Crusade for Christ, Chinese Christian Fellowship, Navigators, Student Fellowship and Studies in the Word. Contact Student Development for additional information.

Student Publications

Poly Post, the official campus newspaper, is published throughout the school year. *Opus,* features art, photography, articles and examples of student literary effort.

Poly Vue

Poly Vue is the annual university open house held in the Spring. The event displays to parents and friends special events and progress of the university, and provides a time for social activities. The entire program is organized and carried out by the students, and includes academic department exhibits, a carnival, horse shows, and intercollegiate athletic events.

A series of activities for high school and junior college students includes a communications day, agricultural events, and business skills and forensic competitions.

Information about Poly Vue and how to become involved may be obtained from the Poly Vue office or the Student Development Center, both of which are located in Union Plaza.

Music, Drama, Forensics

Opportunities are provided for students to participate in theatrical productions, and in

music organizations which include band, orchestra vocal choirs, and smaller vocal and instrumental ensembles. Drama productions include quarterly one-act and three-act plays; musical events include Christmas and Easter programs and a road show tour of California communities. Inter-collegiate competition as well as local events are featured in a strong forensics program.

Recreation Service Center

A joint ASI-student development program, the Recreation Service Center provides low cost backpack and camping equipment rental, equipment recycling, inexpensive planned outings and seminars, retail sales, a recreation information and resources library and many other services related to outdoor leisure activities. The Center is located east of the University Union in the University Park area.

Athletics

Intercollegiate competition is held under the policies and procedures of the athletic board. A program of intercollegiate competition for men and women is offered in a variety of sports which include softball, volleyball, tennis, basketball, baseball, football, cross-country, track and field, and gymnastics.

A new club sports program permits students to compete against similar teams from other colleges and universities in a variety of sports, but at a somewhat more informal level than is found in the varsity sports program. Information about the club sports program may be obtained from the Student Development Center in the Union Plaza.

An extensive intramural program is an integral part of the university and includes team sports, individual sports and recreational activities.

Eligibility for Participation in Student Government and Organizations

University policy requires that students who undertake the reponsibilities of major offices in student government or student organizations be in good standing, and making reasonable progress toward an educational goal. The following specific eligibility requirements for officers of the associated students, either elected or appointed, and for officers of organizations, either elected or appointed, implement that policy:

(1) Candidates and incumbents may not be on disciplinary probation.

(2) Undergraduate candidates and incumbents must have an all-college and Cal Poly grade point average of at least 2.00. Graduate candidates and incumbents must have a graduate grade point average of at least 3.0.

(3) In order to perform the duties of a student body officer, the student must be enrolled in this university during each quarter in which he/she performs the duties of that office. This requirement does not apply during summer quarter.

(4) Incumbents of major student government offices (president, vice-president, treasurer, attorney general, senators, commissioners and chief justice) must successfully complete 21 units of academic credit per year. The minimum number of units to be successfully completed in any quarter is 7 units.

Incumbents of all other offices must successfully complete 36 units of academic credit per year. The minimum number of units to be successfully completed in any quarter is 12 units.

(5) These requirements are independent of any additional student government or student organization requirements.

Questions regarding eligibility for elective or appointive office should be addressed to the Director, Student Development in Union Plaza.

Eligibility for Intercollegiate Athletics

Eligibility for competition in intercollegiate athletics is regulated in general by the rules

of the National Collegiate Athletic Association, the California Collegiate Athletic Association, and the University Policies and Procedures Statement for the Conduct of Intercollegiate Athletics. In particular, prior written authorization from the faculty athletic representative is required for all student athletes who wish to take courses for academic credit at any time at institutions other than this University if the credit is required to become or remain eligible for athletic competition. In absence of the faculty athletic representative, the Vice President of Administration and Student Affairs may provide the necessary authorization.

Student Conduct and Discipline

It is expected that all students are enrolled for serious educational pursuits and that their conduct will preserve an atmosphere of learning. All students are expected to assume the responsibilities of citizenship in the campus community. Association in such community is purely voluntary, and students may withdraw from it at any time that they consider the obligations of membership disproportionate to the benefits. While enrolled, students are subject to university authority, which includes the prerogative of dismissing students whose conduct is inimical to the aims of an institution of higher education.

Rules of student conduct are included in the California Administrative Code, Title 5, beginning at Section 41301.

A student who violates university policies or regulations is subject to disciplinary action which can result in a warning, reprimand, probation, suspension, or expulsion. Procedures under which the university may take disciplinary action against a student are specified by the Chancellor of The California State University. These procedures are on file in the office of the Coordinator of Student Discipline and the office of the Dean of Students.

Inappropriate conduct by students or by applicants for admission is subject to discipline as provided in Sections 41301 through 41304 of Title 5, *California Administrative Code.* These sections are as follows:

Article 1.1, Title 5, *California Administrative Code*

41301. Expulsion, Suspension and Probation of Students. Following procedures consonant with due process established pursuant to Section 41304, any student of a campus may be expelled, suspended, placed on probation or given a lesser sanction for one or more of the following causes which must be campus related:

(a) Cheating or plagiarism in connection with an academic program at a campus.

(b) Forgery, alteration or misuse of campus documents, records, or identification or knowingly furnishing false information to a campus.

(c) Misrepresentation of oneself or of an organization to be an agent of a campus.

(d) Obstruction or disruption, on or off campus property, of the campus educational process, administrative process, or other campus function.

(e) Physical abuse on or off campus property of the person or property of any member of the campus community or of members of his or her family or the threat of such physical abuse.

(f) Theft, of, or nonaccidental damage to, campus property, or property in the possession of, or owned by, a member of the campus community.

(g) Unauthorized entry into, unauthorized use of, or misuse of campus property.

(h) On campus property, the sale or knowing possession of dangerous drugs, restricted dangerous drugs, or narcotics as those terms are used in California statutes, except when lawfully prescribed pursuant to medical or dental care, or when lawfully permitted for the purpose of research, instruction or analysis.

(i) Knowing possession or use of explosives, dangerous chemicals or deadly weapons on campus property or at a campus function without prior authorization of the campus president.

(j) Engaging in lewd, indecent, or obscene behavior on campus property or at a campus function.

(k) Abusive behavior directed toward, or hazing of, a member of the campus community.

(l) Violation of any order of a campus president, notice of which had been given prior to such violation and during the academic term in which the violation occurs, either by publication in the campus newspaper, or by posting on an official bulletin board designated for this purpose, and which order is not inconsistent with any of the other provisions of this Section.

(m) Soliciting or assisting another to do any act which would subject a student to expulsion, suspension or probation pursuant to this Section.

(n) For purposes of this Article, the following terms are defined:

(1) The term "member of the campus community" is defined as meaning The California State University Trustees, academic, nonacademic and administrative personnel, students, and other persons while such other persons are on campus property or at a campus function.

(2) The term "campus property" includes:

(A) real or personal property in the possession of, or under the control of, the Board of Trustees of The California State University, and

(B) all campus feeding, retail, or residence facilities whether operated by a campus or by a campus auxiliary organization.

(3) The term "deadly weapons" includes any instrument or weapon of the kind commonly known as a blackjack, sling shot, billy, sandclub, sandbag, metal knuckles, any dirk, dagger, switchblade knife, pistol, revolver, or any other firearm, any knife having a blade longer than five inches, any razor with an unguarded blade, and any metal pipe or bar used or intended to be used as a club.

(4) The term "behavior" includes conduct and expression.

(5) The term "hazing" means any method of initiation into a student organization or any pastime or amusement engaged in with regard to such an organization which causes, or is likely to cause, bodily danger, or physical or emotional harm, to any member of the campus community; but the term "hazing" does not include customary athletic events or other similar contests or competitions.

(o) This Section is not adopted pursuant to Education Code Section 89031.

(p) Notwithstanding any amendment or repeal pursuant to the resolution by which any provision of this Article is amended, all acts and omissions occurring prior to that effective date shall be subject to the provisions of this Article as in effect immediately prior to such effective date.

41302. Disposition of Fees: Campus Emergency; Interim Suspension. The President of the campus may place on probation, suspend, or expel a student for one or more of the causes enumerated in Section 41301. No fees or tuition paid by or for such student for the semester, quarter, or summer session in which he or she is suspended or expelled shall be refunded. If the student is readmitted before the close of the semester, quarter, or summer session in which he or she is suspended, no additional tuition or fees shall be required of the student on account of the suspension.

During periods of campus emergency, as determined by the President of the individual campus, the President may, after consultation with the Chancellor, place into immediate effect any emergency regulations, procedures, and other measures deemed necessary or appropriate to meet the emergency, safeguard persons and property, and maintain educational activities.

The President may immediately impose an interim suspension in all cases in which there is reasonable cause to believe that such an immediate suspension is required in order to protect lives or property and to insure the maintenance of order. A student so placed on interim suspension shall be given prompt notice of charges and the opportunity for a hearing within 10 days of the imposition of interim suspension. During the period

of interim suspension, the student shall not, without prior written permission of the President or designated representative, enter any campus of The California State University other than to attend the hearing. Violation of any condition of interim suspension shall be grounds for expulsion.

41303. Conduct by Applicants for Admission. Notwithstanding any provision in this Chapter 1 to the contrary, admission or readmission may be qualified or denied to any person who, while not enrolled as a student, commits acts which, were he enrolled as a student, would be the basis for disciplinary proceedings pursuant to Sections 41301 or 41302. Admission or readmission may be qualified or denied to any person who, while a student, commits acts which are subject to disciplinary action pursuant to Section 41301 or Section 41302. Qualified admission or denial of admission in such cases shall be determined under procedures adopted pursuant to Section 41304.

41304. Student Disciplinary Procedures for The California State University. The Chancellor shall prescribe, and may from time to time revise, a code of student disciplinary procedures for The California State University. Subject to other applicable law, this code shall provide for determinations of fact and sanctions to be applied for conduct which is a ground of discipline under Sections 41301 or 41302, and for qualified admission or denial of admission under Section 41303; the authority of the campus President in such matters; conduct related determinations on financial aid eligibility and termination; alternative kinds of proceedings, including proceedings conducted by a Hearing Officer; time limitations; notice; conduct of hearings, including provisions governing evidence, a record, and review; and such other related matters as may be appropriate. The Chancellor shall report to the Board his actions taken under this section.

Student Rights and Responsibilities

All members of the university faculty and staff have a primary mission of helping students in every way possible. The university will do what it can to make a student's progress toward a degree or a credential as rapid and as successful as possible. Nevertheless, *each student is individually responsible for meeting all requirements and deadlines,* academic and administrative, as presented in this publication or in any other announcements of the university, center and department in which he/she is enrolled.

Information regarding student rights and responsibilities can be found in "Statement of Student Rights, Responsibilities, and Grievance Procedures" which can be obtained from the Dean of Students. For provisions on grade appeals, see the section of this catalog on "Grading System".

Plagiarism

Students are hereby informed that the university considers plagiarism a serious academic offense which subjects those engaging in the practice to severe disciplinary measures. Moreover one form of plagiarism, the use of purchased term papers, has been considered so serious that the state legislature has enacted a law providing criminal penalties for sale or other distribution of such materials. Students are, therefore, cautioned against this and all other forms of plagiarism.

SPECIAL PROGRAMS

Early Admission

The early admission program allows academically talented high school students to enroll for up to eight units of university work per quarter while simultaneously completing requirements for graduation at their respective high schools. The university work thus completed is applicable only as university credit and may not be used to meet high school graduation requirements. Consideration for admission to this program is granted students who are earning a 3.00 grade point average in college preparatory courses and who are recommended by the high school principal or counselor.

To be considered for admission a student must:

1. Complete and submit the "Early Admission" application along with the $25.00 nonrefundable application fee.
2. Forward a nomination letter from the high school principal or counselor.
3. Submit two copies of the high school transcript.

Additional information and applications are available in the Admissions Office.

Army ROTC

Army ROTC is a program that provides college trained officers for the U.S. Army, the Army National Guard, and the U.S. Army Reserve. Cal Poly is one of 600 institutions nationwide that offer Army ROTC through cross-enrollment with host institutions. Students from Cal Poly attend Military Science classes at Cal Poly and The Claremont Colleges and participate fully in the Army ROTC. Although Army ROTC is traditionally a four-year program, a two-year program is offered to students completing a six week summer camp and to selected veterans.

Army ROTC aids students by providing leadership and management experience found in few other college courses as well as an opportunity for a military career in the Active Army, Army National Guard, or the U.S. Army Reserve. It develops self-discipline, physical stamina and poise while enhancing development of management skills and qualities basic to success in any career. It also provides academic credit for classroom instruction and a living allowance of up to $1000.00 each year during the final two years of the program.

The four-year program consists of a two-year Basic course and a two-year Advanced course. The Basic course is normally taken during the freshman and sophomore years. The Basic course imposes no military obligation on the part of the students; they may withdraw at any time before the end of the second year. Students with active duty military experience in any of the armed forces may have the first two years waived.

The Advanced course provides further instruction in leadership development, organization and management, and tactics and administration. Advanced course Cadets attend a six weeks advanced camp in the summer between their junior and senior years of college. This camp permits Cadets to put into practice the principles and theories they have acquired from classroom instruction. Cadets receive approximately $880.00 in pay, plus travel expenses, room and board, medical care, and other benefits.

The two-year program permits students with prior active duty military experience and those who complete a six-week basic camp to enter the Advanced course and receive the same instruction and financial assistance. Applicants for the Basic course should apply to the Army ROTC, California State University, Cal Poly, Pomona Campus during the spring preceding the summer Basic camp.

Army ROTC scholarships for full tuition, fees, books, and $100.00 monthly living allowance are offered for periods of four, three and two years to students who are enrolled or are preparing to enroll in Army ROTC. Scholarship recipients, upon entering the final two-years (The Advanced Course), agree to finish ROTC instruction, accept a commission and serve four years on Active Duty. Four-year scholarships are awarded on a world-wide basis to U.S. citizens who will be entering college as a freshman. Recipients must enter one of the 280 host institutions nation-wide rather than a cross-enrolled school. Applications can be obtained from Army ROTC, P.O. Box 7000, Larchmont, NY 10538. Three-year and two-year scholarships are competitive to college students, including those attending Cal Poly who will be cross-enrolled with the Army ROTC program at The Claremont Colleges. Applications and further information can be obtained from the Army ROTC , Cal Poly, Pomona, California 91768. Students attending the Basic camp may also apply for the two-year scholarship.

Students entering the Advanced Course agree to finish ROTC instruction, to accept a commission, and to accept an assignment in either the Active Army, Army National Guard, or the U.S. Army Reserve. Depending upon needs of the Army, they will serve

on active duty for periods from three months to three years unless they are scholarship recipients. Students not serving on active duty for three years have an eight-year Reserve or National Guard obligation.

Army ROTC increases the opportunities for college students by giving them options and potential for either a civilian or military career. Additional information on Army ROTC may be obtained by writing to the Army ROTC, CAL POLY, Pomona, California 91768. Telephone #(714) 594-3080 or (714) 598-0539.

Courses offered at Cal Poly are listed in the catalog section "University Programs."

Air Force ROTC

Through arrangements with the University of California, Los Angeles and the University of Southern California both the two and four-year Air Force ROTC programs and two, three, and four-year scholarships are available to qualified men and women attending California State Polytechnic University, Pomona. Both aptitude and physical examinations are required.

Students may now enroll in the freshman, sophomore, junior, and senior year Air Force ROTC classes on the Cal Poly Pomona campus. Courses offered at Cal Poly are listed in Catalog Section "University Programs."

AFROTC allows interested students to qualify for a commission as a second lieutenant in the U.S. Air Force upon completion of degree requirements. Cadets pursuing technical degrees can compete for 3½-, 3-, 2½-, and 2-year scholarships. AFROTC scholarship's cover costs of tuition, books, and a monthly subsistence allowance. Applications for four-year scholarships must be filed before December 15 of the year preceding entry. The monthly subsistence allowance is also paid to nonscholarship cadets enrolled in the last two years of the AFROTC program.

Students interested in the U.S. Air Force flying program can compete for either a pilot or navigator position which guarantees, for qualified cadets, entry into flying training after graduation.**

Students desiring the two-year program—the last two years of AFROTC—should apply directly to either the USC or UCLA detachment office.

Interested students may call the AFROTC at (714) 598-0538 or stop by Trailer 27, Room 4 on campus. Additional information is available from AFROTC at USC, (213) 743-2670, at UCLA (213) 825-1742, or at Cal Poly Pomona (714) 598-0538.

International Programs

The California State University (CSU) International Programs offers students the opportunity to continue their studies overseas for a full academic year while they remain enrolled at their home CSU campus. The International Programs' primary purposes are to enable selected students to gain a firsthand understanding of other areas of the world and to advance their knowledge and skills within specific academic disciplines in pursuit of established degree objectives.

A wide variety of academic majors may be accommodated by the 25 foreign universities cooperating with the International Programs in 15 countries around the globe. The affiliated institutions are: the University of Sao Paulo (Brazil); the universities of the Province of Quebec (Canada); the University of Copenhagen (through Denmark's International Student Committee's Study Division); the University of Provence (France); the Universities of Hamburg, Heidelberg, and Tübingen (Germany); the Hebrew University of Jerusalem (Israel); the University of Florence (Italy); Waseda University (Japan); the Ibero-Americana University (Mexico); Massey University and Lincoln University College (New Zealand); the Catholic University of Lima (Peru); National Chengchi University (Republic of China/Taiwan); the Universities of Granada and Madrid (Spain); and the

** Students who are physically qualified and plan to enter Air Force pilot training receive 13 hours of flight instruction during the last year of the program.

University of Uppsala (Sweden), and Bradford University (the United Kingdom). Information on academic course offerings available at these locations is in the International Programs Bulletin which may be obtained from the International Programs representative on campus.

Eligibility for application is limited to those students who will have upper division or graduate standing at a CSU campus by September 1984, who possess a cumulative grade point average of 2.75 for all college level work completed at the time of application (some programs require a 3.0 cumulative grade point average), and who will have completed required language study where applicable. Selection is competitive and is based on home campus recommendations and the applicant's academic record. Final selection is made by the Office of International Programs in consultation with a statewide faculty selection committee.

The International Programs supports all tuition and administrative costs overseas for each of its participants to the same extent that such funds would be expended to support similar costs in California. Students assume responsibility for all personal costs, such as transportation, room and board, and living expenses, as well as for home campus fees. Because they remain enrolled at their home CSU campus while studying overseas, International Programs students earn full resident credit for all academic work completed while abroad and remain eligible to receive any form of financial aid (other than work-study) for which they can individually qualify.

Information and application materials may be obtained from Dr. Peter Castro, Department of Biological Sciences or by writing to The California State University International Programs, 400 Golden Shore, Suite 300, Long Beach, California 90802. Applications for the 1984–85 academic year overseas must be submitted by February 9, 1984 (except for the New Zealand program where applications are due by May 15, 1984).

Educational Opportunity Program

The Educational Opportunity Program is designed to assist the historically low-income, educationally disadvantaged student to pursue and complete a college education. Primarily, EOP is a special admissions program. A special admission EOP student is defined as one who, for various reasons such as educational or economic disadvantage, does not meet the traditional standards for admission to a state university. In other words, EOP seeks to admit students with possible potential who come from a low-income disadvantaged background and neither possess the high school grade point average or college entrance examination scores for regular admission to the university.

Once a student is admitted, a variety of support services are made available to enhance and upgrade the student's ability to succeed in college. In addition to special admission, students receive assistance in registration, financial aid, curriculum planning, tutoring, job and graduate school placement, and other support services, based on individual student needs. A full-time coordinator of counseling services is available for personal as well as academic advisement. A full-time coordinator of tutorial services is available to provide tutorial assistance. There are upper division student peer-counselors and tutors who work directly with each new EOP student under the supervision of the coordinators of counseling and tutoring. The academic program includes a two-day live-in summer orientation for new students stressing individual adjustment, study activities and integration of course material. Special classes have been designed in various subject areas to assist students in the transition to college. At the option of the university, additional students may be involved in program activities. Sufficient documentation of EOP candidates' potential and motivation will be required, and references from individuals associated with high schools, educational agencies and other interested parties will be considered in the EOP selection process. Students in the EOP program must be residents of California.

Student Affirmative Action

The Student Affirmative Action (SAA) program offers students an opportunity to obtain

information and services that would benefit them in their pursuit of higher education. SAA works primarily with regularly admissible ethnic minority and women students who have been traditionally underrepresented in higher education. Applicants must be residents of the State of California and be U.S. Citizens or Permanent Residents.

Upon admission to the University, SAA provides a series of academic support services which are provided to enhance opportunities for academic achievement, career preparation, and persistence toward the Bachelor's Degree. The SAA student is entitled to receive academic advisement, professional and peer counseling, tutorial and financial aid application assistance. Services are provided on an individual basis with referral to other campus departments when necessary.

SAA staff works with junior high school, high school, and community college students interested in higher education. Additionally, the Graduate SAA program provides information and assistance to those students interested in graduate or professional schools.

COOPERATIVE EDUCATION

What is Cooperative Education? Cooperative education is a program in which classroom study is combined with a closely related work experience. Its basic purpose is to provide a means whereby a student can combine study at Cal Poly with work experience under the supervision of an employer in order to fulfill the total requirements of a particular educational program. Cooperative education blends theory and practice and provides relevance to a college education. It is a program which offers an innovative and expanded dimension to the education received by students at postsecondary institutions. Cooperative education is viewed as being an integral part of Cal Poly's curricular offerings and as being consistent with the educational goals of a polytechnic university.

Cooperative education programs are based on the following requirements:

1. The student must have at least junior class standing and an overall GPA of 2.0.
2. The off-campus work experience must be directly related to the student's major field of study.
3. The internship or co-op experience must be offered as a credit course by the student's major or minor degree department. The employment, either on a full-time or on a part-time basis, must be an integral part of the student's academic degree program and must be under the direct guidance and supervision of a Cal Poly faculty member.
4. The work experience must be of a sufficient duration to be considered a substantial part of the student's academic program.
5. The standards of work and performance must be maintained. To insure these standards, the student's work must be evaluated periodically, and, at the end of the work period, the student's performance will be self-evaluated and further evaluated by the employer and by the supervising Cal Poly faculty member. The student will be assigned a grade for the course by the faculty supervisor.

Types of cooperative education programs. The "traditional" cooperative education program consists of alternating full-time work and study periods. In this type of program students spend several weeks or up to a full quarter of full-time work on the job and then a fixed period of full-time study on campus. Another model provides part-time work experiences in which students continue their college classes simultaneously with the work period. Under this arrangement, known as the "parallel plan," students generally work 15 to 25 hours per week off campus while carrying on some classwork on campus. Cal Poly offers both types of programs.

Placement and Program Information. Cooperative education placement information is available from the University Office of Cooperative Education located within the Placement Office (Building 1, room 212). The Placement Coordinator is Ms. Sharon Mathis. For additional information on programs available within schools, contact the designated cooperative education school coordinator.

SPECIAL UNIVERSITY CENTERS

SPECIAL UNIVERSITY CENTERS

W. K. KELLOGG ARABIAN HORSE CENTER
ARABIAN HORSE PROGRAM

The oldest campus tradition is the Arabian horse show, first started by W. K. Kellogg in 1926, and continued after his ranch became a university campus. Public performances are given every Sunday in October, November and January through May at 2 p.m. The program, featuring the Arabian as an English, western, stock, trick and jumping horse, is planned and produced by students working with horses they have trained.

The shows are designed to promote interest in the Arabian breed and point up the horse's versatility, beauty, and intelligence, as well as to offer valuable experience for students in handling horses. The Arabians are utilized in the animal science courses related to the ever expanding field of light horse production, research and training. The Kellogg Ranch has been one of the world's outstanding Arabian horse breeding farms, and the university continues the breeding program today, perpetuating the Arabian and making valuable blood lines available to the public. The Kellogg Arabians are a noted attraction for thousands of Southern Californians and tourists who view the show each year.

EQUINE RESEARCH CENTER

The Equine Research Center founded in 1980 complements the program of the W. K. Kellogg Arabian Horse Center. The Research Center, unlike the Kellogg Center, deals with all horse breeds and not only the Arabian. The Research Center conducts investigations in the areas of equine nutrition, physiology, and management. The Research Center is a self-support center funded through national donations with the major contributor being the Oak Tree Racing Association of California.

SOUTHERN CALIFORNIA OCEAN STUDIES CONSORTIUM

The Southern California Ocean Studies Consortium (SCOSC) is the educational and research outlet for the growing marine programs of five State Universities and Colleges in the Southern California area. Those participating institutions include Dominguez Hills, Fullerton, Long Beach, Northridge and Pomona. Presidential appointees from each campus, consisting of a teaching and administrative faculty member, along with two community members make up the SCOSC Board of Governors. In addition, an advisory board representing a cross section of disciplines adds to the Consortium's community responsiveness.

The Southern California Ocean Studies Consortium provides an outlet for shipboard instruction to Consortium members, as well as the community, aboard the fully equipped and crewed research vessel, *R/V Nautilus.*

Through the Consortium's participating intercampus faculty and graduate students, a large reservoir of diverse expertise is coordinated for multidisciplined projects involving the biological sciences, microbiology, chemistry, geology/earth sciences, economics, geography, archaeology, and engineering.

The five member campuses are located within a 50-mile radius of the Consortium's office and the R/V Nautilus slip in downtown Long Beach. The close proximity of the schools allows for easy student accessibility and personal communication between faculty members involved in interdisciplinary projects.

DESERT STUDIES CONSORTIUM

Built in the 1940's as a health resort in the Mojave Desert, the former Zzyzx installation was repossessed by the Bureau of Land Management in 1974 and assigned to the Desert Studies Consortium composed of seven Los Angeles California State Universities including Cal Poly Pomona. The Desert Research Center is under the direction of a Board of Governors composed of one administrator and one professor from each member campus

plus representatives from the Riverside District of the Bureau of Land Management.

Potentially the Desert Studies Center can supplement some 110 courses enrolling 4,700 students annually at the seven Consortium universities whose total enrollment approach 200,000 students. Since the start of the Center, students, faculty, and other users have averaged 1,759 a year.

Ecological and environmental studies of desert conditions mix with more practical investigations of desert land utilization and limitations, of especial interest to the Bureau of Land Management Meteorological problems peculiar to the desert environment can be studied readily, including the transport of smog from the Los Angeles basis, 150 miles away, and such practical questions as utilization of power from sun and wind. Desert hydrologic and limnologic studies are conducted, and geology field trips study exposed rocks. Immediately around Fort Soda, as well as farther away, many primitive sites await archeological excavation and investigation.

Besides students and faculty from the seven sponsoring campuses, persons from other universities and groups interested in scholarly activities are welcome to use the Center facilities. For information on Cal Poly's participation in the Desert Studies Center, contact the Dean of Instruction (Building 1-221).

LEARNING RESOURCES CENTER

The Learning Resources Center, located in the University Library Building, provides a universitywide student service devoted to further developing students' academic proficiencies by a variety of methods. It is a facility which provides students with specialized personnel, equipment, and materials. Programs at the Center emphasize developmental reading (including speed reading), study skills, and writing. Tutoring in most subject areas is usually available by arrangement.

The Learning Resources Center encourages all students to further refine their academic competencies by arranging for personalized programs designed to meet individual needs. Students proceed at their own pace, and receive periodic evaluation of their progress.

Another purpose of the Learning Resources Center is to provide extensions of academic departmental programs by placing in the Center materials prepared by faculty members which pertain to their own courses.

CENTER FOR NORMATIVE STUDIES

James C. Manley, Coordinator

The Center for Normative Studies houses a variety of activities including the Campus Forum, the Campus Forum Retreats, statewide networking related to the project on "Ethics, Values and Conscience" sponsored by The California State University Foundation, and, the Summer Institute for Aesthetics.

The Center fosters transdisciplinary dialogue on ethical and public policy issues and on other normative issues. Other activities which the Center may sponsor include outreach seminars, student-faculty research seminars, and faculty development seminars.

Additional information on the Center and its programs is available for the Office of Undergraduate/Graduate Studies, Bldg 1 Room 221, (714) 598-4722.

SMALL RUMINANT CENTER

The Small Ruminant Center is devoted to teaching and research with sheep and goats. Currently, the Center is investigating ways to improve the efficiency of reproduction and genetic characteristics of small ruminants as a means of increasing food and fiber availability in less developed nations. The Center is a recipient of a Title XII collaborative research support program grant and has as its primary focus semen physiology, its collection, preservation, storage and insemination of small ruminants. The Center is currently collaborating with thirteen United States institutions and with research centers in Brazil and Peru. Other overseas sites for collaboration are currently under consideration. Dr. E. A. Nelson is the lead scientist at the Center.

INSTITUTE FOR CELLULAR AND MOLECULAR BIOLOGY

Jill P. Adler, Director

The Institute for Cellular and Molecular Biology (ICMB) is composed of some 25 scientists from the departments of Biological Sciences, Chemistry, Ornamental Horticulture and Animal Science. The Institute is committed to the goal of enhanced communication between scientists, in fields ranging from physiological ecology to viral nucleic acid synthesis. This multi-disciplinary scientific exchange is based on shared interest in the various research applications of molecular biological techniques. To achieve this objective, the ICMB has instituted the following activities:

1) Regularly scheduling informal luncheon meetings and poster displays to familiarize one another with various research projects;
2) reviewing current literature by participation in a monthly Journal Club;
3) financially supporting innovative pilot research projects and expansion of ongoing research programs in new directions;
4) sponsoring two yearly symposia: one for ICMB members to summarize the progress made on research funded by the Institute; the other for well-known speakers from other Institutions to discuss a particular topic;
5) supporting graduate student research by creating a professional research environment and providing monies for equipment and supplies needed by the graduate students for their thesis work;
6) providing travel funds for faculty to attend workshops to present their research data at scientific meetings, or to collect scientific specimens, and travel funds for graduate students to present their thesis data at professional meetings.

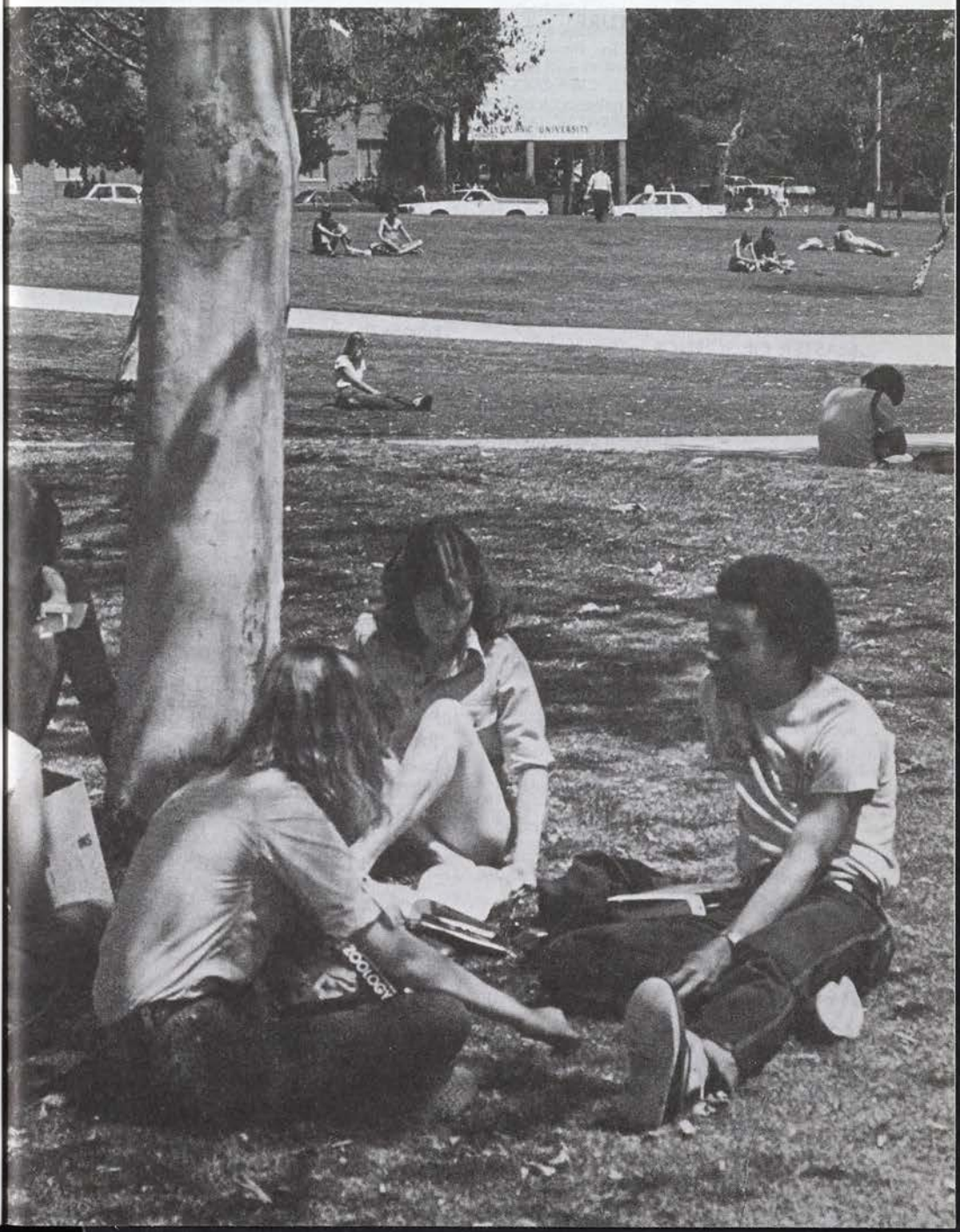
The ICMB Journal Club activities and Symposia provide students with the opportunity to hear about recent advances in molecular biology presented by researchers who do this kind of work. They learn how to listen and learn from material presented in a seminar-type format rather than a lecture-type format. This is especially important for those students who plan to further their education in a graduate or professional school program.

Students interested in participating in the activities of the Institute should contact the Director, Dr. Jill P. Adler.

Other Programs

Other special centers exist in the various schools of the university. Information on these special programs is listed in the school sections of this catalog.

ACADEMIC REGULATIONS AND PROGRAMS



DEGREES AND TEACHING CREDENTIALS OFFERED

The University offers undergraduate curricula leading to the degrees of Bachelor of Arts and Bachelor of Science, and graduate curricula for the masters degree. In addition, programs are offered leading to teaching credentials authorizing service in California public schools. Degrees and teaching credential programs offered by the university are:

SCHOOL OF AGRICULTURE

BACHELOR OF SCIENCE in:

Agricultural Biology 115
Agricultural Business Management 119
Agricultural Engineering 125
Agricultural Science 129
Agronomy 132
Animal Science 136
Foods and Nutrition 144
Fruit Industries 147
Home Economics 150
International Agriculture 154
Ornamental Horticulture 157
Park Administration 160
Soil Science 163

MASTER OF SCIENCE in:

Agriculture,
Agricultural Science Option 455
Animal Science Option 457
Nutrition and Food Management Option 459

SCHOOL OF ARTS

BACHELOR OF ARTS in:

American Studies 170
Art 178
Behavioral Science 183
Drama 199
English 209
History 222
Humanities 229
Liberal Studies 230
Music 233
Philosophy 241
Political Science 255
Social Work 268

BACHELOR OF SCIENCE in:

Anthropology/Geography 172
Communication Arts 190
Economics 204
Physical Education 246
Recreation Administration 261
Social Sciences 266

MASTER OF ARTS in:

English 500

MASTER OF SCIENCE in:

Economics 482
Physical Education 510

SCHOOL OF BUSINESS ADMINISTRATION

BACHELOR OF SCIENCE in:

Business Administration with majors in:
Accounting 277
Computer Information Systems 281
Finance, Real Estate, and Law 285
Management and Human Resources 293
Marketing Management 298
Operations Management 302

BACHELOR OF SCIENCE in:

Hotel and Restaurant Management 290

MASTER OF BUSINESS ADMINISTRATION 469

MASTER OF SCIENCE IN BUSINESS ADMINISTRATION

Business Education Option 471
EDP Auditing Option 472

SCHOOL OF ENGINEERING

BACHELOR OF SCIENCE in:

Aerospace Engineering 311
Chemical Engineering 316
Civil Engineering 320
Electrical Engineering 325
Engineering Technology 333
Industrial Engineering 342
Manufacturing Engineering 342
Mechanical Engineering 349

MASTER OF ENGINEERING 491

SCHOOL OF ENVIRONMENTAL DESIGN

BACHELOR OF ARCHITECTURE 362

BACHELOR OF SCIENCE in:

Landscape Architecture 369
Urban Planning 372

MASTER OF ARCHITECTURE 461

MASTER OF LANDSCAPE ARCHITECTURE 503

MASTER OF URBAN PLANNING 514

SCHOOL OF SCIENCE

BACHELOR OF ARTS in:

Earth Sciences 399

BACHELOR OF SCIENCE in:

Biology 380

Botany 385
Chemistry 389
Computer Science 396
Geology 399
Mathematics 404
Microbiology 412
Physics 415
Zoology 419

MASTER OF SCIENCE in:

Biological Sciences 465
Chemistry 476
Computer Science 479
Mathematics 507

TEACHER PREPARATION CENTER

MASTER OF ARTS in:

Education 485

CREDENTIALS:

Agriculture Specialist Credential 130
Bilingual/Cross Cultural Specialist Credential 430
Multiple Subject Teaching Credential 430
Reading Specialist Credential 430
Single Subject Teaching Credential 430
Special Education Specialist Credentials:
Learning Handicapped 430
Severely Handicapped 430
Resource Specialist Certificate 430

APPROVED MINOR PROGRAMS (By School and Department*)

SCHOOL OF AGRICULTURE

Agricultural Business Management Department
Agricultural Business Management 120
International Agriculture 155
Animal Science Department
Animal Science Minor 137
Soil Science Department
Soil Science Minor 164

SCHOOL OF ARTS

Art Department
Art History 178
Behavioral Sciences Department
Criminal Justice and Corrections 185
Communication Arts Department
Communications 191
Newspaper Journalism 192
Public Relations 192
Speech Communication 192
Drama Department
Drama 199
Economics Department
Economics 204
English & Foreign Languages Department
English 210
Spanish 210
Ethnic and Women Studies Department
American Indian Studies 219
Afro-American Studies 219
Asian-Pacific Studies 219
Chicano/Hispanic Studies 219
Women's Studies 219
History Department
History 222
Latin American Studies 222
Music Department
Music 234
Physical Education Department (HPERD)
Recreation Administration 262
Political Science Department
Political Science 256
Public Administration 256
Social Sciences Department
American Studies 170
Anthropology 172
Geography 172
Philosophy 241

SCHOOL OF BUSINESS ADMINISTRATION

Business 276
Computer Information Systems Department
Business Computer Programming 282
Finance, Real Estate and Law Department
Business Law Minor 285
Management and Human Resources Department
Administrative Management 294
Human Resources Management 294
Small Business Management 294
Marketing Department
Marketing Management 298

SCHOOL OF ENGINEERING

Energy Engineering 354
Materials Science and Engineering 355
Ocean Engineering 356

SCHOOL OF SCIENCE

Biological Sciences Department
Botany 386
Comparative Systems Analysis 425
Entomology 420
Microbiology 413
Plant Pathology 386
Zoology 420
Chemistry Department
Chemistry 390
Computer Science Department
Computer Systems Organization 396
Scientific Computer Programming 396

* See department listing for details.

Mathematics Department
Mathematics 389
Statistics 389

Physics Department
Physics 398

COURSE NUMBERING SYSTEM

Courses are grouped into number series indicating the level at which they are presented.

1-99 Courses carrying no credit toward degree requirements.

100-299 Courses taught primarily in the freshman and sophomore years and generally introductory in nature.

300-399 Courses primarily for advanced undergraduate students, usually having prerequisites, bearing graduate degree credit upon the approval of the advisor.

400-499 Courses for advanced undergraduates, and graduate, and post-baccalaureate students; courses 461, 462 and 463 shall not apply to master's degree requirements.

500-599 Courses open only to graduate and post-baccalaureate students, or seniors with prior approval. (See page 78)

600-699 Courses open only to unconditionally classified graduate students.

900-999 Courses including specialized workshops, seminars, and institutes designed to provide professional and occupational improvement. Not acceptable for credit towards a master's degree.

Requirements For Bachelor's Degree

General Requirements

A candidate for the bachelor's degree shall have

1) completed the courses in one of the listed baccalaureate curricula with a minimum "C" grade average for all units in the major;
2) completed the required general education courses;
3) completed the required courses in American history and government, including state and local government. This requirement is met by completing AMC 201 & 202 or the equivalent PLS 201 & HST 202;
4) spent not less than three quarters in residence, two of these quarters immediately preceding graduation;
5) earned not less than 50 quarter units in residence applicable to the bachelor's degree;
6) earned a total number of grade points at least equal to twice the number of units attempted (achieve a "C" grade average);
7) completed for a Bachelor of Arts degree a minimum of 186 quarter units with a minimum of 60 of those units being of 300 or 400-level courses; completed for a Bachelor of Science degree a minimum of 198 quarter units with at least 27 of these units being in 300 or 400-level courses listed for the major. No major will contain less than 54 quarter units of courses required in the core for the major. Within these 54 units must be at least 15 units of 100 and 200-level courses. The courses in the major must be exclusive of those courses taken to satisfy the general education requirements;
8) passed the Graduation Writing Test (G.W.T.), or qualify for a waiver under continuous enrollment provisions. Passed the Entry-level Math Exam (ELM);
9) a graduation check. An appointment for this records check shall be made in the evaluations office approximately three quarters before expected date of graduation;
10) filed an application for graduation in the registrar's office prior to the deadline listed in the academic calendar.

Determination of Graduation Requirements

In determining graduation requirements, students have two basic options open to them. They may decide to meet the degree requirements listed in the Cal Poly university catalog at the time they first entered the university apply as their graduation requirements, or they may decide to use the requirements listed in the university catalog at the time of their graduation.

Whenever a student changes major, this action is considered a break in status (loses continuing student status), and he/she will come under either the graduation requirements published in the Cal Poly university catalog at the time the major or status was changed or under the provisions of the catalog applicable to the period in which he/she wishes to graduate.

A community college student transferring to Cal Poly without a break in enrollment status may elect the graduation requirements listed in the Cal Poly university catalog at the time of his/her entry into the community college. After entry to Cal Poly, any change of status or major will cause him/her to come under the catalog provisions valid at the time of the change in status or major.

ENTRY-LEVEL MATHEMATICS REQUIREMENT

All students entering CSU as of fall 1983–84 must demonstrate basic competence in mathematics. First-time freshmen can qualify for exemption on the basis of satisfactory performance on certain equivalent examinations. These examinations and the required

minimum score are listed below. Transfer students can qualify for exemption either on the basis of satisfactory performance on an equivalent examination or by having completed the General Education-Breadth Requirement in Quantitative Reasoning (with a grade of C or better), provided it is at the level of intermediate algebra or above.

Exemption from the ELM exam is allowed for performance at or above the level specified below in the following examinations:

Examination	Score
College Board Advanced Placement Math Test (AB or BC)	3
Scholastic Aptitude Test—Mathematics (SAT-M)	530
American College Testing (ACT)—Math	23
College Board Math Achievement Test, Level 1	520
College Board Math Achievement Test, Level 2	540

Students required to take this examination should do so at the earliest opportunity after admission. (The results of this examination *do not* affect admission.) Failure to take the examination before the end of the first term may lead to probation and disqualification according to Section 41300.1 of Title 5, *California Administrative Code* and CSU Executive Order 338. At Cal Poly Pomona "earliest opportunity after admission" is defined as by the end of the student's first quarter of enrollment and students who fail to do so will receive a hold and must register and take the next scheduled exam or not be allowed to attend the university during the next regular quarter.

Students who cannot demonstrate basic competence on the examination are required to take steps to overcome deficiencies early in their enrollment. Any coursework undertaken primarily to acquire the required competence shall not be applicable to the baccalaureate degree.

Information bulletins and registration materials for the ELM Examination will be mailed to all students who may be subject to the requirement or they may be obtained from the Office of Admissions and Records. Further information regarding the examination and possible exemptions may be obtained from Dr. Robert Bradley, Test Officer, Bldg. 1, Room 106.

ENGLISH PLACEMENT TEST (EPT) Requirement *

All entering freshmen and lower division students who enroll with fewer than 56 transferable semester units must complete the CSU English Placement Test (EPT) with the exception of students who present one of the following:

1. Satisfactory scores on the CSU English Equivalency Examination.
2. Score of 3, 4, or 5 on the English Composition Examination of the College Board Advanced Placement Program.
3. A score of 600 or above on the College Board Achievement Test in English Composition with Essay.
4. A score of 510 or above on the Verbal section of the College Board Scholastic Aptitude Test (SAT-Verbal).
5. A score of 23 or above on the ACT English Usage Test.
6. Completion of an acceptable college course in English composition of four-quarter or three-semester units with a grade of C or better.

Failure to take the English Placement Test at the earliest opportunity after admission may lead to administrative probation which, according to Section 41300.1 of Title 5, *California Administrative Code,* and CSU Executive Order 186, may lead to disqualification from further attendance. At Cal Poly Pomona "earliest opportunity after admission" is defined as by the end of the student's first quarter of enrollment and students who fail to do so will receive a hold and must register and take the next scheduled exam or *not*

* Since both the EPT and the GWT requirements are subject to modification subsequent to the publication of this catalog, students are advised to check for up-to-date information on these requirements at the Test Center (Bldg. 1, Room 106)

be allowed to attend the university during the next regular quarter. The results of the EPT will not affect admissions eligibility but will be used to identify students who need special help in reading and writing in order to do college-level work.

Information bulletins and registration materials for the EPT will be mailed to all students subject to the requirement. The materials may also be obtained from the Office of Admissions and Records.

Graduation Writing Test (GWT) Requirement *

All students subject to degree requirements listed in the 1977–78 and subsequent general catalogs must demonstrate competency in writing skills as a requirement for graduation. Based on action taken by the Cal Poly Pomona Academic Senate in 1978, writing competence at Cal Poly is assessed by means of an essay and an objective test. All persons who receive undergraduate, graduate, or external degrees from Cal Poly Pomona must pass the Graduation Writing Test (GWT). Foreign students, immigrants, and permanent residents must also pass the GWT test to receive a degree. The only persons exempt from the GWT requirement are students who have been in continuous enrollment since spring 1977.

A mandatory GWT registration policy requires that the test be taken by the quarter following the completion of 135 units (for undergraduates) or by the completion of 12 units (for graduate students). If the GWT is not taken by this time, a hold will be placed on a student's registration materials, and he or she will not be allowed to attend classes the following quarter unless the hold is removed. A hold on registration may be removed by signing up for the next GWT administration.

Important information about specific exemptions from the test is contained in the GWT fact sheet, which is mailed to all new students. Fact sheets may also be obtained from the Test Office, Bldg. 1, Room 106.

General Education Requirements

Every student must take a substantial proportion of coursework for the bachelor's degree designed to develop professional competence. In addition, the student must develop the knowledge, skills, and understanding which will enable the student to function as an intelligent and creative member of the community. To achieve these goals, the university provides an integrated program of curricular and co-curricular activities which are organized to provide an educational experience appropriate to the needs of the individual student.

Under the provisions of Title 5 of the California Administrative Code, the university offers a variety of courses in general education. The pattern of courses included in the program is designed primarily to insure that students:

1. Develop the ability to express themselves effectively in both written and oral communication and in critical thinking which includes consideration of common fallacies in reasoning;
2. Understand nature and are able to relate themselves to their biological and physical environment;
3. Are familiar with their cultural heritage and have developed the capacity to be creative and to appreciate the creativity of others;
4. Understand the economic, political, technological, and social problems of contemporary society and responsibilities and procedures of modern citizenship;
5. Have a basic understanding of the requirements of good health and are able to maintain their own physical well-being;
6. Have developed an understanding of themselves and their relationships to others.

To be eligible for graduation with a bachelor's degree from California State Polytechnic

* Since both the EPT and the GWT requirements are subject to modification subsequent to the publication of this catalog, students are advised to check for up-to-date information on these requirements at the Test Center (Bldg. 1, Room 106)

University, Pomona, a student must complete a minimum of 72 quarter units of general education of which 12 quarter units must be upper division and shall be taken no sooner than the quarter in which the student achieves upper division status. No course in a student's major core may be used to satisfy the general education requirements.

Twelve quarter units of the total 72-unit general education program must be completed in residence at California State Polytechnic University, Pomona.

Since general education is under continued ongoing review, the framework, guidelines, and coursework approved to meet general education requirements may change from one catalog cycle to another. Therefore, students who change majors or otherwise have a break in status may find that they are subject to new degree requirements. Careful academic and career planning is essential.

Questions related to general education requirements should be directed to the Office of Undergraduate/Graduate Studies (Building 1, Room 221).

General Education Exceptions

An exception to the General Education requirements has been approved on a program-by-program basis for the School of Engineering. For details on the approved General Education requirements for the School of Engineering, students should contact the Office of the Dean, School of Engineering. There may be other program deviations to the universitywide approved General Education requirements which are approved subsequent to the publication of this catalog. Students are advised to check with their major department or with the Office of Undergraduate/Graduate Studies (Bldg. 1, Room 221).

General Education—Approved Coursework and Unit Distribution

Courses approved and unit distributions to meet the General Education requirements are listed in the catalog section "General Education." Since the General Education requirements, as implemented at Cal Poly Pomona, and the courses approved to meet these requirements may be modified or changed subsequent to the publication of this catalog, students are advised to contact the Office of Undergraduate/Graduate Studies (1–221) for the most current list of approved G.E. courses and requirements.

Limited Enrollment—Courses Open to Majors Only

Because of impaction in certain academic majors, enrollment in courses within these programs is limited to approved majors only. Certain exceptions are possible with written permission of the instructor and the department chair by an academic petition.

Exclusion of Students from Classes

1. An instructor may at any time exclude from his or her course students who are disrupting the orderly conduct of the classroom or are a hazard to themselves or others.
2. Upon excluding a student from a class, the instructor shall, within two academic days, inform the following individuals in writing of the reasons for exclusion from class and that the student has three academic days to file a protest with the instructor's dean.
   a. The instructor's department chairperson
   b. The instructor's school dean
   c. The student's major department chairperson
   d. The student's major school dean
   e. The student
   f. The Director of the University Counseling Center

The student has three university academic days from the date of exclusion during which a formal protest may be lodged with the instructor's school dean concerning the instructor's decision. If the student desires to make such a protest, the school dean and depart-

ment chairman will interview both the faculty member and the student(s) involved and the dean will make a final decision within three university academic days as to whether or not the student is to be allowed to return to class.

3. If the faculty member wishes to prefer disciplinary charges against the student involved, the faculty member shall submit such charges in writing to the office of the Coordinator of Student Discipline. However, it will still be necessary to go through the specified process.

Scholastic Requirements

Each student is expected to meet the academic standards required by the state, the university and by the instructors. Every student is expected to attend classes regularly. The instructor of a class may excuse student absences from the class.

Students may not remove an incomplete simply by re-enrolling in the course. In cases where repetition of the course is deemed appropriate, the student will be assigned a withdrawal or failing grade rather than an "I" grade. If students subsequently complete a course which is recorded as incomplete on a transcript from another institution, it is their responsibility to submit a corrected official transcript and advise the registrar that they wish to receive credit.

It is possible for a student to have three final examinations scheduled for the same day. If that happens, the student has the liberty of asking the professor of the middle exam to pick a mutually convenient time for the exam.

Students may not enroll in courses in subject areas in which they have already taken more advanced coursework (e.g. MAT 106 after taking MAT 114) for the purpose of raising the Grade Point Average (GPA).

MINIMUM SCHOLARSHIP REQUIREMENTS

Uniform minimum standards for academic probation or disqualification are in effect at all The California State Universities. Students will be placed on academic probation or disqualified under the following conditions:

1. A student will be placed on academic probation if the cumulative grade point average falls below 2.0 (C) either for all college-level work attempted or for all work attempted at this university. The student will be advised of probation status on the grade report which is mailed to each student at the end of each quarter.
2. A student will be removed from probation and restored to good standing when a cumulative grade point average of 2.0 (C) for all university level work attempted and for all such work attempted at this university is earned.
3. Full-time undergraduate students are considered to be maintaining satisfactory academic progress toward their degree goal when they have completed a minimum of 36 units per academic year of which a minimum of 24 units directly apply to satisfying the core and/or support and directed course requirements of their major curriculum according to their Degree Requirement Evaluation sheet (or until such time as all core and support course requirements are satisfied). Good standing is defined as 2.0 GPA.

   Half-time students are considered to be maintaining satisfactory academic progress toward their degree goals when they have completed a minimum of 18 units per academic year of which a minimum of 12 units directly apply to satisfying the core and/or support and directed course requirements of their major curriculum according to their Degree Requirement Evaluation sheet (or until such time as all core and support course requirements are satisfied). Good standing is defined as maintaining at least a 2.0 GPA.
4. A student on probation is subject to disqualification and *may* be disqualified from the university when the cumulative grade point balance for all college level work attempted or for all such work attempted at this university is 7 or more grade points below

2.0 (C average) at the end of any quarter.

5. Students *will* be automatically disqualifed at the end of fall and spring quarters if:
   a. a freshman or sophomore (less than 90 quarter units of university work completed) is 22½ or more grade points below a 2.0 (C average).
   b. a junior (90 to 134 quarter units of university work completed) is 13½ or more grade points below a 2.0 (C average).
   c. a senior (135 or more quarter units of university work completed) is 9 or more grade points below a 2.0 (C average).

   Notices are sent as soon as possible following the end of the quarter.
6. Students subject to scholastic disqualification will have a hold placed on their permits to register the following quarter. Such students can obtain release of their permits to re-enroll only after they have filed with the Records Office an Advising Contract signed by their department chair certifying that they have been properly counseled as to how they should regain good standing and that they have been advised of the consequences of failure to do so.
7. Exceptions may be made in the case of an error or in the case of a student who has been admitted or reinstated on probation and who has earned at least a 2.0 each quarter after such admission or reinstatement.
8. A student who is disqualified for scholastic reasons will not be reinstated until at least one regular quarter has elapsed. In particular, a student automatically disqualified at the end of fall quarter will not be considered for reinstatement until at least the following spring quarter, and a student automatically disqualified at the end of the spring quarter will not be considered for reinstatement until at least the following winter quarter. A student may be reinstated only after presentation to the university of satisfactory evidence that he/she has improved his/her chances of scholastic success. The application for reinstatement must be filed in the Records Office after approval by the student's major department chair and the dean of the school in which the student wishes to enroll.

Academic Policies

MINORS

Academic minors are offered in a number of disciplines at this university. A listing of the minors currently available is included in the sections of the catalog at the beginning of the individual school sections showing degrees, options and minors offered by each school. The procedures to be followed in order to elect a minor are available in departmental or school dean's offices. A minimum GPA of 2.0 for all units in the minor must be attained prior to the granting of the minor. Open only to undergraduate students.

SECOND BACCALAUREATE DEGREE

Admission to seek an additional bachelor's degree for holders of such degrees is processed by the admissions office in the same way as other undergraduate admissions.

A student who has earned a baccalaureate degree at an accredited institution must meet the curricular requirements for the second baccalaurate degree as well a minimum residence requirements established by this University. A minimum of 50 units must be taken in residence and, of the 50 units, 36 shall be earned in upper division courses with 18 of these upper division units being in courses in the major.

Advanced standing will be granted for work completed for the original baccalaureate degree as applicable to the new degree objective. Work completed at this university prior to awarding of the original baccalaureate degree shall be counted as appropriate toward the residence requirements for the second degree. Any change in general degree requirements (such as General Education) will have to be met in order to receive the second baccalaureate degree.

DOUBLE MAJORS

Normally a student meets graduation requirements for a degree in one of the major departments. However, it is permissible for a student to be granted a degree with two majors if all requirements of both major curicula are met.

Any major completed by the student leading to the single degree being awarded will be listed on the diploma as long as only a single degree is considered. If the student has completed the requirements for both a BA and BS, he/she will be required to distinguish only one as the degree in order to determine the appropriate diploma to be awarded, and the notation on the diploma.

No more than one diploma will be granted to a student at the close of a given quarter. This is distinguished from the two majors leading to a single degree. However, all majors completed by a student will be listed on the official transcript of record.

Students who wish to receive a double major are required to meet *all* degree requirements in *both* majors.

TRANSFER CREDIT

A student who has attended accredited two-year or four-year colleges will be given full credit for college level courses successfully completed. Credit for courses taken at other institutions counts toward fulfillment of major curriculum requirements when applicable; other courses count as elective credit.

Not more than 70 semester units (105 quarter units) may be allowed for credit taken in a junior college. No credit may be allowed for professional courses in education taken in a junior college.

A maximum of 36 quarter units of extension course credit may be applied toward the bachelor's degree. Students taking more than 36 quarter units through Continuing Education or through the Open University will have only the first 36 of those units, which may be considered by the university as college level transferable work, count towards meeting degree requirements. No coursework above the first 36 units of allowable transferable credit will be included in meeting any degree requirements. This policy is subject to change and may be revised subsequent to the publication of this catalog. Up-to-date information on this policy is available from the Dean of Instruction (Bld 1—Room 221).

No limit is placed upon the number of transferable credits from a four-year college or university, except that no student will be granted a bachelor of science degree in any curriculum without having met the general unit, grade, and residence requirements.

No credit will be given for work taken at an unaccredited institution until the student has successfully completed 30 quarter units of work at this university. At that time, and upon recommendation of the student's major department, credit will be given for the unaccredited work.

Once a student has commenced work at this university, approval of the advisor must be secured prior to taking courses at another institution for credit toward major requirements at this university. (See also concurrent enrollment section and eligibility for intercollegiate athletics section.)

GRADING SYSTEM

	The following grading system is in effect	*Grade Points*
A	Superior	4.0
	(A—)	(3.7)
B	Above average	3.0
	(B+, B—)	(3.3, 2.7)
C	Average	2.0
	(C+, C–)	(2.3, 1.7)
D	Below average	1.0
	(D+, D—)	(1.3, 0.7)
I	Incomplete	0

		(Units attempted charged after 1 year)
SP	Satisfactory progress	0
F	Fail	0
		(Units attempted charged)
W	Official withdrawal	0
AU	Audit (no credit)	0
U	Unofficial withdrawal	0
		(Units attempted charged)

Passing grades are A, B, C, or D. See graduate section for grading criteria for graduate courses. A change of a letter grade of "A–F" must be submitted to the Records Office by the end of the quarter following the quarter in which the original letter grade was awarded. Under no circumstances will a grade change of any kind be posted after the student has graduated. Plus and minus (+/—) grading symbols are granted at the discretion of the instructor.

An Audit grade (AU) signifies that a student has audited a course through an approved process. Enrollment as an auditor is subject to permission of the instructor; provided that enrollment in a course as an auditor shall be permitted only after students otherwise eligible to enroll on a credit basis have had an opportunity to do so. Auditors are subject to the same fee structure as credit students and regular class attendance is expected. Once enrolled as an auditor, a student may not change to credit status unless such a change is requested prior to the last day to add classes. A student who is enrolled for credit may not change to audit after the last day to add courses for the quarter.

An Incomplete (I) signifies that a portion of required course work has not been completed and evaluated in the prescribed time period due to unforeseen, but fully justified reasons and that there is still a possibility of earning credit. After the request of the student for the "I" grade, or at the initiation of the course instructor, the faculty member makes the decision as to whether or not an "I" grade is issued. If an "I" grade is issued, the faculty member determines what conditions must be met for the "I" to be removed. However, to protect both students and faculty, it is necessary that there be a written record of the conditions. Thus, if there is a later disagreement, or if the instructor is no longer available, the "I" can still be handled by the department. The form which is to be used for writing the conditions mentioned above is (Incomplete Grade Conditions, form # F-168-01) available in the departmental offices. The completed forms are filed in the department office.

The awarding of an "I" requires prior consultation with the student. The student has the responsibility to confer with the faculty member to learn the requirements for removal of the "I". At that time the student is given a copy of the form detailing the conditions to be met.

An "I" must be made up within the time period set forth by the instructor with a maximum allowable time span of one calendar year immediately following the end of the term in which it was assigned. This limitation prevails whether or not the student maintains continuous enrollment. Failure to complete the assigned work will result in an "I" being counted as equivalent to an "F" for grade point average computation.

An "I" may not be changed to a passing grade as the result of re-enrolling in the course. In cases where repetition of the course is appropriate, the student will be assigned a withdrawal or failing grade rather than an "I" grade.

If a student subsequently completes a course which is recorded as incomplete on a transcript from another institution, it is the student's responsibility to submit a corrected official transcript and advise the registrar that he/she wishes to receive credit.

The "SP" symbol is used in connection with courses that extend beyond one academic quarter. The symbol indicates that work in progress has been evaluated as satisfactory to date but that the assignment of a precise grade must await the completion of additional course work. Cumulative enrollment in units attempted may not exceed the total number applicable to the student's educational objective. All work is to be completed within one

calendar year of the date of first assignment of SP and a final grade will be assigned to all segments of the course on the basis of overall quality. Any extension of this time period must receive prior authorization by the advisor, department chair and school dean on a general academic petition. For master's degree thesis or projects (695, 696), the time limit is two years.

The "W" symbol indicates that the student was permitted to drop the course after the 15th day of classes. It carries no connotation of quality of student performance and is not used in calculating grade-point average or progress points. A "W" cannot be recorded unless the student has filed a drop for that class in the records office. Dropping of classes after the Third Week of instruction and prior to the last 15 days of instruction is permissible only for serious and compelling reasons. Approval for this is by petition. Students who withdraw from the quarter will receive the "W" in all coursework if they file an approved petition in the records office by the end of the seventh week of instruction. After the seventh week of instruction, course instructors may assign letter grades (A-F) or the "W" for cousework taken by the student.

The symbol "U" indicates that an enrolled student did not withdraw from the course but failed to complete course requirements. It is used when, in the opinion of the instructor, completed assignments or course activities or both were insufficient to make normal evaluation of academic performance possible. For purposes of grade point average and progress point computation this symbol is equivalent to an "F". The "U" is also assigned when a student does not drop a course properly.

Students may not take courses at equal or lower level than other coursework already taken in the same subject matter for the purpose of raising grade point average (GPA). Such coursework may only be taken on an "AU" basis. Exceptions are permitted only when the course description allows for repetition.

Grades will be mailed from the records office as soon as possible after the close of a quarter to the most recent address on file in the record's office.

Under the provisions of Executive Order 320, "Assignment of grades and grade appeals," and Cal Poly University's "Statement of Student Rights, Responsibilities, and Grievance Procedures," students may appeal grades that they consider to be unfair. In the appeal process, however, it is a basic presumption that the grades assigned to a student are correct. Thus, the burden of proof rests with the student who is appealing. For specifics of the appeal procedure, students should contact the Dean of Instruction (Bld 1 Room 221).

CREDIT/NO CREDIT (CR/NC) GRADING POLICY

Courses will be graded on a CR/NC basis as follows:

I. *Mandatory CR/NC Grading*

A. Some courses, as indicated by their catalog descriptions are offered for CR/NC grading only. Such courses are designated by the sponsoring department. *Enrollment in these courses is not counted in the 24-unit limit or the* 2-course/8 unit limit described in IIA below.

B. All challenge examination credit will be awarded on CR/NC basis only. Credit for these courses will be counted in the 24-unit or on the 2-course/8-unit limit described in IIA below.

II. *Optional CR/NC Grading*

A student may elect to be graded on a CR/NC basis in those courses which are designated by the University as being approved for optional grading. When a student elects CR/NC grading, the following conditions apply.

A. A student may take up to two courses per quarter, not to exceed eight units, on a CR/NC basis. The total number of units which are graded CR/NC may not exceed 24 units for all college level work to be counted towards a bachelor's degree, and eight units for a master's degree including all transfer work.

B. A student who opts for CR/NC must already be regularly enrolled in the course. Before the end of the third week of classes, *the student must file the CR/NC request form in the Records Office.* A student may not change from one grading option to the other after the end of the third week of classes.

C. A course may not be repeated as CR/NC if the student has previously been enrolled in that course for the traditional grading option. A course may be repeated for CR/NC only if a grade of NC has been earned previously.

D. Undergraduate and post-baccalaureate students seeking a second degree will be given a grade of CR for coursework equivalent to a grade C or better in any course for which CR/NC grading is approved and in which the student is properly enrolled. NC will be assigned for coursework equivalent to D or F grades.

For graduate courses designated as mandatory CR/NC, the grade of "Credit" will be given for coursework equivalent to a grade of "B" or better. "No credit" will be given for coursework equivalent to a "C", "D", or "F" grade. This will apply to both graduate and undergraduate students who are enrolled in graduate courses.

E. Courses in the student's major ("Core Courses in Major" on the student's curriculum sheet) may not be taken as CR/NC unless designated as mandatory CR/NC grading.

F. To be eligible to opt for CR/NC grading, an undergraduate student must have earned at least a 2.0 GPA in all Cal Poly work attempted. A graduate student must have earned at least a 3.0 GPA. New students enrolling at Cal Poly for the first time are eligible if they were admitted on a "clear" basis.

III. *Grades of CR/NC are not included in the student's grade point average.* Courses for which CR is recorded will be counted as units completed only.

IV. *Non-matriculated Students in External Degree Programs, The Open University, The Extension Program, Summer Session, and/or Workshops.*

These regulations apply to all students enrolling at Cal Poly including non-matriculated students in the Extension Program, summer session, and workshops who wish to elect courses on a Credit/No Credit grading basis. (The 2.0 GPA requirement is waived in the case of non-matriculated students having no previous work recorded at Cal Poly.)

REPETITION OF COURSES

A currently enrolled undergraduate student may attempt to improve his or her grade point average by repeating a limited number of courses in which he or she has been assigned a C, D, F, U, or I grade. A maximum of 16 units of course work may be repeated at this university. This includes courses taken at other institutions, previous challenge attempts and extension courses. For example, a student may repeat four different 4 unit courses or four different 3 unit courses and one 4 unit course, etc.

1. Regular or Extension enrollment at this university may be used as repetition of a course which was: challenged, taken at Cal Poly, or taken at another institution.
2. Each course may be repeated only 2 times for purposes of this policy.
3. A challenge cannot be used as a repetition of a course in which one was enrolled.
4. In instances in which a Cal Poly catalog course number has been changed, the chairperson of the department offering the course must verify that the two courses are equivalent.
5. This policy includes courses taken at other institutions and repeated at this university if the two courses are determined to be equivalent by the chairperson of the department offering the course. The grade point average at this university cannot be improved by repeating a Cal Poly equivalent course at another institution.

Whenever a course is repeated for credit, the grade earned most recently will be the

official grade, whether it is higher or lower than any previous grade(s) for the same course. Although previous grades in the course will remain on the student's permanent record card, they will be identified as having been repeated. Only the units attempted in the most recent enrollment will be included in the grade point average.

It is the responsibility of the student to complete and file in the Records Office a Repeated Course Notification Form during the quarter the repeat is being attempted. Repeated Course Notification forms will only be accepted from students currently enrolled.

The policy outlined above applies only to courses taken for undergraduate credit repeated at this university before receiving a bachelor's degree.

ACADEMIC RENEWAL

It is permissible for an undergraduate student to request the removal of up to three quarters or two semesters of previous academic work from baccalaureate degree consideration. The following two conditions must prevail before such a request may be made:

1. Five years have elapsed since the most recent work to be disregarded was completed.
2. Since the completion of the work to be disregarded, the applicant has completed, *at this university,* 22 quarter units with at least a 3.0 GPA, 45 quarter units with at least a 2.5 GPA, or 67 quarter units with at least a 2.0 GPA. Work completed at any other institution shall not be used to satisfy this requirement.

Having met the above conditions, the student may apply for removal of work from degree consideration in a letter to the Committee on academic Renewal through the Dean of Instruction (Bld 1 Room 221). The letter shall specify which semester(s) or quarter(s) of previous work are to be removed from consideration with supporting statements providing evidence that

1. The work is substandard and not respresentative of the student's present scholastic ability and level of performance.
2. The level of performance represented by the work under consideration was due to extenuating circumstances, which are described.
3. The applicant would need to complete additional units of work and enroll for one or more additional quarters to qualify for the baccalaureate degree if the request is not approved.

If the committee acts favorably upon the request, the student's academic record will be annotated to show that *no* work taken during the disregarded term(s), even if satisfactory, may apply toward baccalaureate requirements. All work, whether or not disregarded, will remain legible on the student's academic record.

RETROACTIVE WITHDRAWAL

A student who discontinues attendance and participation in *all* coursework in which he/she is officially enrolled for a particular academic quarter without a formal filing of "The Petition for Withdrawal from the Unversity" will receive the administrative grade of "U" in all coursework officially enrolled in for that quarter.

A student may petition to have these grades retroactively changed to the administrative grade of "W" if he/she can demonstrate and document that there were serious and compelling reasons for circumstances which compelled the unofficial withdrawal from the university during the quarter in question.

Students who wish to apply for retroactive withdrawal must do so within the next regular quarter following the quarter in which they unofficially withdrew from the university. For the purposes of retroactive withdrawal, summer quarter is not counted as a regular quarter. Applications for retroactive withdrawal will be accepted up to 30 days into the quarter in which a student enrolls.

Petitions are available from the Office of the Dean of Instruction (1-221).

GRADUATE COURSES TAKEN BY UNDERGRADUATES FOR GRADUATE CREDIT *

An undergraduate may petition for up to 13 quarter units of graduate credit for courses taken as an undergraduate student providing that:

1. none of the courses to be taken for graduate credit is required for the bachelor's degree;
2. the student has senior standing (has completed 135 quarter units) and an upper-division grade point average of 2.5 or better; some departments may specify a higher G.P.A.
3. the petition is submitted before the end of the third week of the quarter in which the work is performed;
4. the petition is endorsed by the course instructor, and approved by the Dean of Instruction.

When the petition has been approved, the courses for which such credit is requested will be identified on the permanent record card (transcript) with the letter "G". Such courses and units will not be applicable to the bachelor's degree.

When an undergraduate student takes a graduate course, there will be no differential evaluation procedure. All students in the class will be considered graduate students and will be graded as if they were.

GRADUATE COURSES TAKEN BY UNDERGRADUATES FOR UNDERGRADUATE CREDIT *

An undergraduate may petition for up to 13 quarter units of graduate courses to be taken for undergraduate credit providing that:

1. The student has senior standing (has completed 135 quarter units) and has an upper division GPA of 2.5 or better.
2. The petition is submitted prior to the end of the third week of the quarter in which the work is performed.
3. The petition is endorsed by the student's instructor and advisor, and approved by the Dean of Instruction.

ADVANCED PLACEMENT

California State Polytechnic University, Pomona grants credit toward its undergraduate degrees for successful completion of examinations of the Advanced Placement Program of the College Entrance Examination Board. Students who present scores of three or better will be granted six semester units (nine quarter units) of college credit. For specific information on Advanced Placement credit contact the Office of Undergraduate/Graduate Studies (1-221).

CREDIT BY EXAMINATION *

Cal Poly, Pomona grants credit to those students who pass examinations that have been approved for credit systemwide. These include the CSU English Equivalency Examination and some CLEP examinations.

Exam	*Score*	*Credit*	*Units*
CLEP General Chemistry	48	Chemistry 103	4
CLEP Mathematics General Exam (1975 edition) The passing score must be earned on both parts of the exam	50	general education elective	4
CLEP College Algebra-Trigonometry	49	Math 104 or Math 105, but not both	4

* Subject to change. Contact Office of Undergraduate/Graduate Studies for further information (714-598-4722).

CLEP Calculus and Analytic Geometry	48	Math 125	4
CLEP Statistics (with essay)	49	STA 107 + 1 elective or STA 120	3 + 1 or 4
CSUC Biology Examination	50 (raw score	Biology 110 + 1 elective	3 + 1
American Chemistry Society Cooperative Exam in General Chemistry	50th %tile	Chemistry 103	4

English Equivalency Examination Program

Students who pass the English Equivalency Examination, consisting of the CLEP Analysis and Interpretation of Literature test and two 45-minute essays, receive credit for English 104 (4 units), English 105 (4 units), and 1 unit of elective credit.

College Board Advanced Placement Program

Credit is given for College Board Advanced Placement scores of 3, 4, or 5. Between 8 and 12 quarter units of specific course credit or elective credit will be awarded for a qualifying score on each Advanced Placement exam for which Cal Poly offers equivalent or related courses.

CREDIT BY CHALLENGE EXAMINATION (Graded on a CR/NC basis only)

Students may challenge courses by taking examinations developed at the campus. Credit shall be awarded to those who pass them successfully.

An approved Petition for Credit by Examination permits regularly enrolled students to obtain credit by examination in subject matter fields in which they are especially qualified through nontraditional education or experience and for which credit has not previously been granted for any similar or more advanced course. Students are not permitted to obtain credit by examination unless all prerequisites for the course as specified in the *University Catalog* have been satisfied.

Challenge exams shall not be permitted as a means of earning a higher grade in a course. Once a student has enrolled in and earned a grade (passing or failing) in a course, the only way to earn a higher grade is to repeat the course and pay normal course unit fees. A course may be challenged only once.

No student, including resident, out of state, or foreign, shall be permitted by an instructor to sit in a class without either enrolling for audit or credit, and paying appropriate fees. Challenge exam credit will not be given for any course that has been audited.

Units of credit received through this procedure may not apply toward the residence requirement for any of the degrees or credentials offered by the University.

A fee per unit is charged for each challenge examination. The length of the examination will be consistent with the unit value of the course. It may include written, oral, or skills tests, or a combination of all three types and will be sufficiently comprehensive to determine that the student has essentially the same knowledge and skills as those students who successfully complete the course are required to possess. The credit received is entered on the student's permanent record.

Detailed instructions for applying for credit by examination may be obtained from the Records Office.

CREDIT FOR INSTRUCTION IN NON-COLLEGIATE SETTINGS

California State Polytechnic University grants undergraduate degree credit for successful completion of formal instruction appropriate to the baccalaureate in non-college settings, either military or civilian, that has been recommended by the Commission on Educational Credit and Credentials of the American Council on Education. The number of units allowed are those recommended in the *Guide to the Evaluation of Educational*

Experience in the Armed Services and the *National Guide to Educational Credit for Training Programs.*

CREDIT FOR MILITARY SERVICE

Nine units of elective credit will be allowed toward a baccalaureate degree for a student with an honorable discharge from the military services of the United States who submits evidence of satisfactory completion of one year of military training.

An additional 13½ quarter units of elective credit will be allowed toward graduation to any student submitting evidence that he has received a commission in the Army, Navy, Air Force, Coast Guard, or Marine Corps. Maximum total credit possible toward graduation for military service is 22½ quarter units. Credit is not given for completion of the six-month reserve training programs or for college level general educational development tests.

Credit for specific courses may be allowed if the student has satisfactorily completed equivalent study in a military service school. The guidelines of the American Council on Education are followed in determining eligibility and approval must be granted by the department teaching the specific course for which credit is sought.

HONORS AND HONORARY SOCIETIES

HONORS AT ENTRANCE

First-time freshmen may be awarded "Honors at Entrance" if during their tenth, eleventh, and twelfth grades they earned a grade point average of at least 3.5 in all subjects excluding physical education and military science, and have received a commendation from their high school principals for having contributed in the areas of citizenship and leadership.

HONOR LISTS

The "Academic Honors List," announced at the end of each quarter, honors undergraduate students who have completed 12 or more units during the quarter with a 3.3 or better grade point average.

The "President's Honor List," announced at the end of the spring quarter, honors undergraduate students who have a grade point average of 3.3 or better for completion at the university of 12 or more units during any three of the four quarters of a university year.

HONORS AT GRADUATION

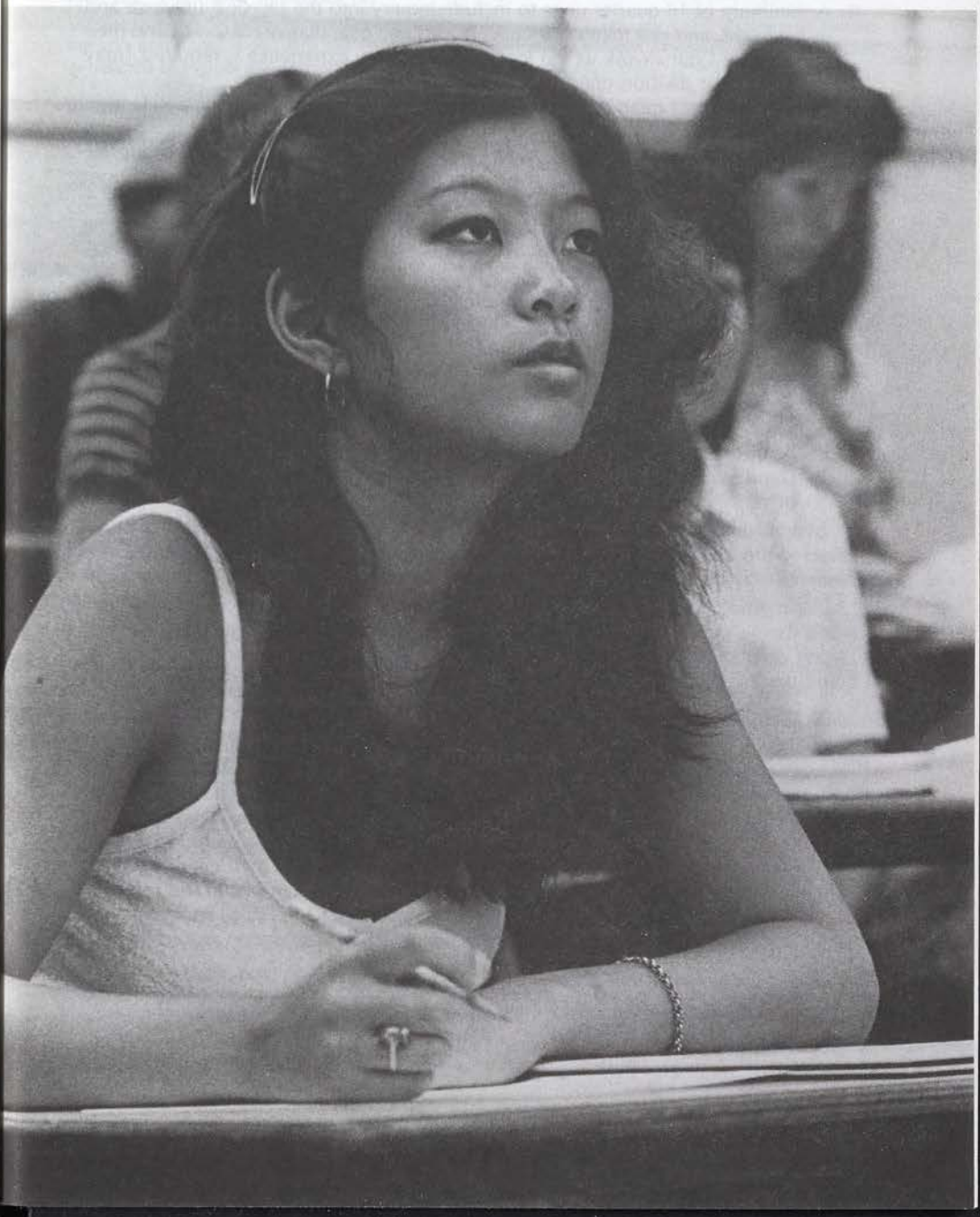
The University grants honors at graduation to students who have demonstrated academic excellence during their career in higher education. The grade point average for the determination of honors is calculated on all grades earned at this institution as well as any other institution of higher education attended. The honors designation with the grade point average required is: summa cum laude—3.80–4.00; magna cum laude—3.60–3.79; cum laude—3.30–3.59.

UNIVERSITYWIDE HONORARY SOCIETY

SIGMA XI

The members of the Society of the Sigma XI are scholars who have produced significant research in the pure or applied sciences. The object of the Society is to encourage original investigation in the physical, life, agricultural, earth, medical, and behavioral sciences, mathematics, and engineering. Membership is gained by being elected by an institutional chapter, by a duly authorized club, or by the Chapter-at-Large. The membership of the Cal Poly, Pomona Sigma Xi Authorized Club consists of faculty and students. The Club has the authority to elect Associate Members.

GENERAL EDUCATION



General Education

General Education—Unit Distribution

The General Education Program at California State Polytechnic University, Pomona shall be organized into the following distribution areas:

I. A minimum of 12 quarter units in the English language including both oral and written communication and in critical thinking including consideration of common fallacies in reasoning.

II. A minimum of 16 quarter units to include inquiry into the physical universe and its life forms, and into mathematical concepts and quantitative reasoning and their application. Coursework which includes laboratory experience is required (may include upper division units).

III. A minimum of 12 quarter units among the arts, literature, philosophy, and foreign languages (may include upper division units).

IV. A minimum of 12 quarter units dealing with human social, political, and economic institutions and behavior and their historical background (may include upper division units).

V. A minimum of 4 quarter units in study designed to equip human beings for lifelong understanding and development of themselves as integrated physiological, social, and psychological entities.

VI. A minimum of 8 quarter units in United States history, Constitution, and American ideals.

VII. A minimum of 12 upper division units to be distributed as follows:

A. Thematic where the purpose of the option is to provide a study of a major theme from a variety of disciplinary points of view. All courses under this option must relate to a single integrated theme and must represent at least two of the general education distribution areas, or

B. Depth where the purpose of the option is to provide depth in an academic area of study outside of the student's major.

The overall unit requirements of Category VII must include 4 upper division units approved to meet the overall unit requirements of areas II, III, or IV. The upper division requirement may be met in the following ways:

a) 12-unit theme package which includes 4 units from areas II, III, or IV;
b) 8-unit theme package plus an additional 4 units from areas II, III, or IV;
c) 12-unit depth sequence which includes 4 units from areas II, III, or IV;
d) 8-unit depth sequence plus an additional 4 units from areas II, III, or IV.

General Education—Approved Coursework

Courses approved by category to meet the university general education program requirements. Coursework in general education should not be taken within a specific curricular goal. Students should consult with their departmental degree advisors or with the staff of the University Advising Center. Many degree programs specify which university approved courses meet their more specific degree requirements. Such departments will list approved courses in their degree curriculum layouts and in their catalog section.

Courses listed as a sequence should be taken in order. For example, in the sequence MAT 114–115, MAT 114 should be completed before taking MAT 115. Each course in the sequence counts as one course toward meeting general education requirements.

General Education—Course Lists

CATEGORY I—Communication in the English Language (12 units, lower division).

Students may select either Pattern 1 or Pattern 2 to meet this category.

Pattern 1

ENG 104 Freshman Composition (4)

The fundamentals of written expression. Frequent papers, based chiefly on the student's personal experiences. Readings, 4 lecture-discussions. ENG 102 and ENG 103 may be substituted for this course. Students must take the English Placement Test (EPT) in order to enroll.

SP 100 Public Speaking (4)

Theory and practice of speech organization, composition, and delivery. Use of research materials. 4 lecture-participations.

PHL 202 Logic and Semantics (4)

Inductive and deductive processes in reasoning; the effects of semantic considerations on reasoning and communication, with examples from contemporary society. Emphasis on detection and avoidance of logical and semantic errors. 4 lecture-discussions.

Pattern 2

ENG 104 Freshman Composition (4)

The fundamentals of written expression. Frequent papers, based chiefly on the student's personal experiences. Readings, 4 lecture-discussions. ENG 102 and ENG 103 may be substituted for this course. Students must take the English Placement Test (EPT) in order to enroll.

SP 204 Advocacy and Argument (4)

An investigation into logical methods of proof and different modes of advocacy. Argument as measured by formal validity and rhetorical effectiveness. Principles of argumentation with application of contemporary forms of public advocacy. 4 lecture-participations.

and one of the following:

ENG 105 Freshman Composition (4)

Frequent papers, chiefly informative and persuasive, with an emphasis on language and logic. Techniques of the research paper. Readings. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

COM 216 Report Writing (4)

Report-writing techniques. Research, organization, and preparation of specialized and technical information. Regular written reports. 4 lecture-discussions. Prerequisite: ENG 104.

COM 219 Technical Writing (4)

The principles of technical writing with extensive practice in the preparation of technical materials in the various forms common to the engineering fields. 4 lecture-discussions. Prerequisite: ENG 104.

CATEGORY II—Science and Mathematics (16 units)

Each pattern is divided into areas. Students are required to take at least one course from each area within the chosen pattern. A minimum of 16 units must be completed and at least one laboratory course must be included. These requirements may also be partially fulfilled by a course from an upper division package (Section VII). Laboratory classes are marked with an asterisk (*). Students *must* take the Elementary Mathematics Test (ELM) for placement purposes prior to enrolling in any MATH course.

Pattern 1: Recommended for students whose majors are in the Schools of Agriculture, Engineering, or Science.

Area A.

(All students must pass the ELM or equivalent in order to enroll)

MAT 105 College Algebra (4)

Real numbers, inequalities, absolute value, coordinate systems, functions, progressions, linear and quadratic systems, polynomials and mathematical induction. Not open to any student with credit for MAT 115. 4 lecture-discussion. Prerequisite: MAT 011 or MAT 050.

MAT 106 Trigonometry (4)

The circular functions, general reduction formulas, inverse functions, graphs, exponential and logarithmic functions, Law of Sines, Law of Cosines, identities and complex numbers. Not open to any student with credit for MAT 115. 4 lecture-discussions. Prerequisite: MAT 011 or MAT 050.

MAT 114, 115, 116 Analytic Geometry and Calculus (3) (3) (4)

Introduction to analytic geometry, elementary functions, limits. Theory and technique of differential and integral calculus of one variable. 3 lecture-discussions. Prerequisite: MAT 105 and 106 or equivalent.

MAT 130, 131 Technical Calculus (4) (4)

Survey of analytic geometry, calculus of rational, exponential, logarithmic, and trigonometric functions. Basic ordinary and partial differentiation. 4 lecture-discussions. Prerequisite: MAT 106.

STA 107 Introduction to Statistics (4)

Collection and summarization of data; measures of central tendency and dispersion, probability, binomial and normal distributions, sampling theory. Not open to Mathematics or Engineering majors. 3 lecture-discussions. Prerequisite: MAT 011 or MAT 050.

STA 120 Elementary Statistics with Applications (4)

Collection and summarization of data, measures of central tendency and dispersion, probability, binomial and normal distributions, sampling theory; special emphasis on applications in business. Not open to Mathematics or Engineering majors. 4 lecture-discussions. Prerequisite: MAT 050 or equivalent.

STA 220 Discrete Probability Models (4)

Set-theoretic approach to probability in finite sample spaces. Conditional probability, independence, the binomial distribution. 4 lecture-discussions. Prerequisite: MAT 105.

Area B.

CHM 104 College Chemistry (3) FWSpSu

Principles of atomic structure, periodicity, stoichiometry, gases, solutions, acids and bases, equilibrium, oxidation-reduction, electrochemistry, thermodynamics and their applications to the life sciences and agricultural sciences. To be taken in sequence. For majors not requiring calculus. Prerequisite to CHM 104: high school chemistry or CHM 103 and high school algebra. Concurrent: CHM 141, respectively.

*** CHM 141 College Chemistry Laboratory (1) FWSpSu**

Laboratory to accompany College Chemistry lecture series. Experiments in stoichiometry, acid-base, pH and redox titrations, simple quantitative analysis, gas measurements, ionic equilibria, and qualitative analysis. To be taken in sequence concurrently with CHM 104, respectively.

CHM 111 General Chemistry (3) FWSpSu

Atomic theory of structure and bonding, chemical equations, gas laws, oxidation-reduction, electrochemistry, states of matter, equilibrium, acids and bases, thermodynamics and reaction kinetics and their applications to chemistry, physics, and engineering sciences. For majors requiring calculus. To be taken in sequence. Prerequisite to CHM 111: high school chemistry or CHM 103 and high school algebra. Concurrent: CHM 151, respectively.

*** CHM 151 General Chemistry Laboratory (1) FWSpSu**

Laboratory to accompany General Chemistry lecture series. Experiments in basic quantitative analysis techniques, gas measurements, acid-base, pH, and redox titrations, electrochemistry, kinetics, thermodynamics, and ionic equilibria and qualitative analysis procedures. To be taken in sequence concurrently with CHM 111, respectively.

*** ESC 111 Principles of Geology (3–5) FWSp(Su)**

Fundamental geologic processes, general surface features and the earth's interior. Minerals, rocks and structures. 3 lectures, 1 three-hour laboratory and weekend field trips. Laboratory is optional for non-majors. Lecture only—3 units; lecture plus lab—4 units; lecture, lab, and field trips—5 units.

PHY 121 College Physics (3) FWSpSu

A study of vectors, motion, forces, gravity, work and energy, momentum, angular motion, and

mechanical properties of matter. 3 lectures. Not for students majoring in physics or engineering. Prerequisite: MAT 051 or MAT 106 or equivalent. *Staff*

PHY 131 General Physics (3) FWSpSu

Fundamental principles of mechanics, vectors, statics, uniform motion, accelerated motion, work and energy, and rotational motion. 3 lectures. Prerequisite: MAT 114; MAT 115 must be taken concurrently or previously. *Staff*

*** PHY 141 College Physics Lab (1)**

*** PHY 151 General Physics Lab (1)**

Area C.

BIO 110 Life Science (3) FWSpSu

Biological implications in the modern world. The relation of biology and technology to problems in population, reproduction, heredity, evolution, and conservation. Designed for all majors other than Biological Sciences, Agriculture, and Physical Education. 3 lectures. *Armentrout, Brum, Castro, Quinn.*

*** BIO 111 Life Science Laboratory (1) FWSpSu**

Companion laboratory for BIO 110. Should be taken concurrently with BIO 140.

*** BIO 115 Basic Biology (5) FWSpSu**

Introduction to living things; basic structure and function of plants and animals and their relationship to the physical world. 3 lectures, 2 three-hour laboratories. *Brown, Roche, Sperry.*

Area D

*** BOT 124 Plant Structures and Functions (5) FWSpSu**

Structure and function of plants. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Riznyk*

CHM 105 College Chemistry (3) FWSpSu

Principles of atomic structure, periodicity, stoichiometry, gases, solutions, acids and bases, equilibrium, oxidation-reduction, electrochemistry, thermodynamics and their applications to the life sciences and agricultural sciences. To be taken in sequence. For majors not requiring calculus. Prerequisite to CHM 104: high school chemistry or CHM 103 and high school algebra. Concurrent: CHM 142, respectively.

*** CHM 142 College Chemistry Laboratory (1) FWSpSu**

Laboratory to accompany College Chemistry lecture series. Experiments in stoichiometry, acid-base, pH and redox titrations, simple quantitative analysis, gas measurements, ionic equilibria, and qualitative analysis. To be taken in sequence concurrently with CHM 105, respectively.

CHM 112 General Chemistry (3) FWSpSu

Atomic theory of structure and bonding, chemical equations, gas laws, oxidation-reduction, electrochemistry, states of matter, equilibrium, acids and bases, thermodynamics and reaction kinetics and their applications to chemistry, physics, and engineering sciences. For majors requiring calculus. To be taken in sequence. Prerequisite to CHM 111: high school chemistry or CHM 103 and high school algebra. Concurrent: CHM 152, respectively.

*** CHM 152 General Chemistry Laboratory (1) FWSpSu**

Laboratory to accompany General Chemistry lecture series. Experiments in basic quantitative analysis techniques, gas measurements, acid-base, pH, and redox titrations, electrochemistry, kinetics, thermodynamics, and ionic equilibria and qualitative analysis procedures. To be taken in sequence concurrently with CHM 112, respectively.

CS 101 Introduction to Computers for Non-CS Majors (4)

Introduction to computer use, time-sharing and batch programming, computer hardware and software, flow charting of algorithms, computer applications, social and economic implications. 4 lecture-discussions. Not open to CS majors.

CS 105 Fundamentals of Computer Science (4)

The stored program computer, central processing unit, memory, input/output, control of information flow. Elementary data structures. Problem analysis and algorithm design, flowcharts, structured

programming. Numeric and non-numeric applications using a subset of one or more high-level languages. 4 lecture-discussions. Prerequisite: MAT 105 and MAT 106 or equivalent.

CIS 110 Introduction to Computer Systems (4)

Introduction to computers, their capabilities and limitations. Programming a computer as a problem-solving tool. Uses and impact of computers in society. 4 lectures.

*** ESC 112 Historical Geology (3–4) FW**

Changes in continents and ocean basins, fossil populations during successive geological ages, 3 lectures. May be taken without lab by non-majors (3) if taken with a 1 three hour lab (4).

ESC 115 Introduction to Astronomy (3) FWSP (Su)

A descriptive course dealing with the history of astronomy and the development of the basic laws of planetary motion and gravity. Discusses origin and properties of planets in the solar system. Examines properties of the sun in detail. 3 lecture-discussions.

ESC 116 Introduction to Astronomy (3) FWSp (Su)

Methods, principles and instruments used in astronomical investigations. Examination of physical and chemical properties of stars. Theories as to origin, state and future of the universe. A consideration of man's place in the cosmos. 3 lecture-discussions.

*** ESC 117 Astronomy Laboratory (1) FWSp**

Provide students with experience in the use of refracting, reflecting and solar telescope. Identification and location of planet, constellations and principal stars. Night time meetings and some field trips should be anticipated. 1 three-hour laboratory. Prerequisite: ESC 115 or consent of instructor.

ESC 120 Introductory Oceanography (3) WSp

Introduction to the physical, chemical and geological character of the oceans and ocean basins. Ocean processes and agents. Origin of the oceans. Resources of the oceans. 3 lectures.

MAT 214. Calculus of Several Variables (4) (4)

Vector analysis applied to three dimensional analytic geometry. Theory and technique of multivariable calculus, power series, 4 lectures. Prerequisite: MAT 116.

MAT 216. Differential Equations (4)

The theory of ordinary differential equations with emphasis on the linear case. 4 lecture-discussions. Prerequisite: MAT 116.

*** MIC 201 Basic Microbiology (5) FWSpSu**

Morphology, classification, physiology, and cultivation of bacteria; relation of bacteria to health of man, animals, and plants. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 110 or 115; CHM 111, 151 or CHM 104, 141. *Staff*

PHY 122 College Physics (3) FWSpSu

Heat, wave motion, sound, light and optical devises. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 121. *Staff*

PHY 132 General Physics (3) FWSpSu

Fundamental principles of harmonic motion, waves, fluid mechanics, thermodynamics, kinetic theory, and geometrical optics. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 131; MAT 116 must be taken concurrently or previously. *Staff*

*** PHY 142 College Physics Lab (1)**

*** PHY 152 General Physics Lab (1)**

*** ZOO 137 Invertebrate Zoology (5) FWSpSu**

Evolution and general biology of major phyla of invertebrate animals, Protozoa to Chordata; introduction to the structure and function of invertebrate organ systems. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Mercer, Roche*

*** ZOO 138 Vertebrate Zoology (5) FWSpSu**

Evolution and general biology of animals within the phylum Chordata; introduction to the structure and function of vertebrate organ systems, 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Baskin, Moriarty, Stewart*

STA 221 Elements of Statistics (4)

Descriptive statistics. Ungrouped and grouped data. Statistical distributions. Sampling techniques, confidence limits. Analysis of variance. Regression and correlation. 4 lecture-discussions. Prerequisite: STA 220.

EGR 201 Role of Engineering in Society (3)

A study of the development of technology, explosion of knowledge in the scientific fields; impact on culture, education and economics; automation; current developments in industry and technology. For non-engineering majors and as free elective credit for engineering majors. 3 lectures.

Pattern 2: Recommended for students whose majors are in the Schools of Arts, Environmental Design, or Business Administration.

Area A.

(All students must pass the ELM in order to enroll.)

MAT 105 College Algebra (4)

Real numbers, inequalities, absolute value, coordinate systems, functions, progressions, linear and quadratic systems, polynomials and mathematical induction. Not open to any student with credit for MAT 115. 4 lecture-discussions. Prerequisite: MAT 011 or MAT 050.

MAT 106 Trigonometry (4)

The circular functions, general reduction formulas, inverse functions, graphs, exponential and logarithmic functions, Law of Sines, Law of Cosines, identities and complex numbers. Not open to any student with credit for MAT 115. 4 lecture-discussions. Prerequisite: MAT 011 or MAT 050.

MAT 114, 115, 116 Analytic Geometry and Calculus (3) (3) (4)

Introduction to analytic geometry, elementary functions, limits. Theory and technique of differential and integral calculus of one variable. 3 lecture-discussions. Prerequisite: MAT 105 and 106 or equivalent.

MAT 125 Introductory Calculus for Business (4)

Graphing, differentiation, integration of rational and exponential functions, with special emphasis on applications to business. Not open to any student whose major requires the MAT 114 sequence. 4 lecture-discussions. Prerequisite: MAT 011 or MAT 050 or equivalent.

MAT 135 Survey of Geometry (4)

The fountainhead of all geometrical investigations, modern elementary geometry, elementary transformations, Euclidean constructions, dissections and paper folding, survey of non-Euclidean and projective geometries, and topology. 4 lectures. Prerequisites: two years of high school mathematics, including algebra and geometry.

STA 107 Introduction to Statistics (4)

Collection and summarization of data; measures of central tendency and dispersion, probability, binomial and normal distributions, sampling theory. Not open to Mathematics or Engineering majors. 3 lecture-discussions. Prerequisite: MAT 011 or MAT 050.

STA 120 Elementary Statistics with Applications (4)

Collection and summarization of data, measures of central tendency and dispersion, probability, binomial and normal distributions, sampling theory; special emphasis on applications in business. Not open to Mathematics or Engineering majors. 4 lecture-discussions. Prerequisite: MAT 011 or equivalent.

Area B.

CHM 101 Consumer Chemistry (3)

Introduction to atoms, molecules, and bonding. Petrochemicals, plastics, and fibers. Air and water pollution. Body chemistry, food, drugs, and poisons. Chemical and nuclear energy. 3 lectures.

CHM 103 Fundamentals of Chemistry (4) FWSpSu

Atoms, molecules and physical states of matter. Important classes of chemical compounds and chemical reactions. Experimentation as the approach to solving problems of natural phenomena. Not open to students who have credit for CHM 104 or 111. 3 lectures, 1 recitation.

ESC 101 Fundamentals of Earth Science (4) FWSp(Su)

The earth's place in the solar system. Geological processes involving the atmosphere, oceans and the earth's crust. 3 lectures, 1 recitation. Not open to students who have credit for ESC 111, 321.

PHY 102 Fundamentals of Physics (4) FWSpSu

Various theories of matter and energy and the principles and laws that describe their behavior and applications. Some special knowledge of modern science that will function in a socially desirable manner in the lives of students. 3 lectures, 1 recitation. Prerequisite: A college math course. PHY 102 is not open to students who have credit for PHY 121 or 131. *Reeder, Parker*

Area C.

BIO 110 Life Science (3) FWSpSu

Biological implications in the modern world. The relation of biology and technology to problems in population, reproduction, heredity, evolution, and conservation. Designed for all majors other than Biological Sciences, Agriculture, and Physical Education. 3 lectures. *Armentrout, Brum, Castro, Quinn.*

*** BIO 111 Life Science Laboratory (1)**

Companion laboratory for BIO 110. Should be taken concurrently with BIO 110.

*** BIO 115 Basic Biology (5) FWSpSu**

Introduction to living things; basic structure and function of plants and animals and their relationship to the physical world. 3 lectures, 2 three-hour laboratories. *Brown, Roche, Sperry.*

Area D.

AGR 111 Introduction to Plant Science (4) FWSp

Introduction to the fundamental characteristics of economic plants and their interaction with the environment. 4 lectures.

AS 111 Animal Agricultural Science (4)

An introductory course to familiarize students with the scope, opportunities, terminology and relationship of the various production, marketing, service and regulatory functions in Animal Science. 4 lectures.

BOT 112 World of Plants (4)

The biology of plants, their role in the ecosystems, and their importance in human civilization. 3 lectures, one 3-hour laboratory. *Staff.*

BIO 201 Environmental Conservation (3) FWSpSu

Fundamental concepts, historical development, problems and practices concerning conservation of natural resources in the United States. 3 lectures. Prerequisite: BIO 110, 115 or equivalent. *Erspamer, Quinn, Riznyk, Stewart.*

BIO 213 Principles of Evolution (3) FWSpSu

Introduction to plant and animal evolution. 3 lectures. *Firstman, Troncale.*

BIO 220 Introduction to Marine Biology (4) FW

Introduction to life in the oceans. General survey of animal and plant groups, ecology of the major marine environments, and influence of man: pollution, fisheries, aquaculture. 3 lectures, 1 activity (field trip). *Castro.*

CS 101 Introduction to Computers for Non-CS Majors (4)

Introduction to computer use, time-sharing and batch programming, computer hardware and software, flow charting of algorithms, computer applications, social and economic implications. 4 lecture-discussions. Not open to CS majors.

CIS 110 Introduction to Computer Systems (4)

Introduction to computers, their capabilities and limitations. Programming a computer as a problem-solving tool. Uses and impact of computers in society. 4 lectures.

EGR 201 Role of Engineering in Society (3)

Study of the development of technology, explosion of knowledge in the scientific fields; impact on culture, education and economics; automation; current developments in industry and technology. For non-engineering majors and as free elective credit for engineering majors. 3 lectures.

*** ESC 111 Principles of Geology (3–5) FWSp(Su)**

Fundamental geologic processes, general surface features and the earth's interior. Minerals, rocks and structures. 3 lectures, 1 three-hour laboratory and weekend field trips. Laboratory is optional for non-majors. Lecture only—3 units; lecture plus lab—4 units; lecture, lab, and field trips—5 units.

*** ESC 112 Historical Geology (3–4) FW**

Changes in continents and ocean basins, fossil populations during successive geological ages, 3 lectures. May be taken without lab by non-majors (3) if taken with 1 three-hour lab (4).

ESC 115 Introduction to Astronomy (3) FWSP(Su)

A descriptive course dealing with the history of astronomy and the development of the basic laws of planetary motion and gravity. Discusses origin and properties of planets in the solar system. Examines properties of the sun in detail. 3 lecture-discussions.

ESC 116 Introduction to Astronomy (3) FWSp(Su)

Methods, principles and instruments used in astronomical investigations. Examination of physical and chemical properties of stars. Theories as to origin, state and future of the universe. A consideration of man's place in the cosmos. 3 lecture-discussions.

*** ESC 117 Astronomy Laboratory (1) FWSp**

Provide students with experience in the use of refracting, reflecting and solar telescope. Identification and location of planet, constellations and principal stars. Night time meetings and some field trips should be anticipated. 1 three-hour laboratory. Prerequisite: ESC 115 or consent of instructor.

ESC 120 Introductory Oceanography (3) WSp

Introduction to the physical, chemical and geological character of the oceans and ocean basins. Ocean processes and agents. Origin of the oceans. Resources of the oceans. 3 lectures.

ESC 250 Environmental Geology (3) FWSp

Geologic problems related to environment; geologic hazards (landslides, earthquakes, floods); groundwater development, pollution and depletion of natural resources; soil erosion and conservation; human interference with geologic processes; geothermal power. 3 lectures.

FN 205 Contemporary Aspects of Nutrition (4)

The modern concept of nutrition as related to diet and body function emphasizing the requirements during adolescence and adulthood. Nutrition and physical activity. Nutrients in foods and their utilization in the body. 4 lectures. For students not majoring in Foods and Nutrition.

MAT 125 Introductory Calculus for Business (4) FWSpSu

Graphing, differentiation, integration of rational and exponential functions, with special emphasis on applications to business. Not open to any student whose major requires the MAT 114 sequence. 4 lecture-discussions. Prerequisite: MAT 105 or equivalent, or consent of instructor.

MIC 100 Elements of Microbiology (3) FWSp(Su)

Microorganisms and man's existence. Elements of microbiology and applications to daily life. For nonbiological science majors. 3 lecture-discussions. *Barlet, Jackson, McKane.*

*** ZOO 235 Human Physiology (4) FWSpSu**

Functions of the major organ systems of the human body with emphasis on the homeostatic mechanisms. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 115. *Steele.*

ANT 101 Introduction to Physical Anthropology (4)

Man as a bio-cultural species; evolution of human behavior as an adaptive biological process; human nature as species-specific behavior; human variability viewed from both a diachronic and synchronic perspective. 4 lecture-discussions.

GEO 101 Physical Geography (4)

Basic principles of physical geography. Significance of earth-related distribution patterns with reference to their effect on man's activities. 4 lecture-discussions.

*** AGB 165 Introduction to Arthropods (4) FWSpSu**

Arthropods and certain relatives affecting food, plants, animals, man and his buildings. Emphasizing insects, mites, ticks, spiders, snails, and slugs; their morphological and phylogenetic relationships; habits and habitats; important characteristics affecting the well-being of mankind. 3 lectures, 1 three-hour laboratory.

VS 205 Physiology of Domestic Animals (4)

Physiological processes of the organ systems of the animal body. Concepts of integrative and homeostatic mechanisms will be discussed. 4 lectures. Prerequisite: BIO 115.

*** VS 206 Anatomy of Domestic Animals (3)**

Laboratory demonstrations and discussions involving the comparative anatomy of the skeleton, musculature and digestive systems of the horse, cow, sheep, and pig. 2 lectures, 1 three-hour laboratory. Prerequisite: BIO 115.

*** SS 231 Basic Soil Science (4) FWSpSu**

Introduction to soils, including physical, chemical and biological properties of soils, soil-plant interrelations, soil formation and classification, and soil moisture. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 104 or equivalent. *Pattern, Tullock.*

Pattern 3: Required for students who plan to meet state requirements for elementary school teachers and for credential program majors in liberal studies. The courses in each of the following areas are to be taken in a sequential manner. Students must take *all* courses listed in order to meet General Education Requirements.

Area A.

(All students must pass the ELM in order to enroll.)

MAT 205 Basic Concepts of Elementary Mathematics (4)

Development of systems of numeration; evolution of the logical basis of the number systems of arithmetic; elementary concepts in logic and set theory; introduction to number theory. 4 lectures. Prerequisite: High school algebra and geometry.

MAT 206 Concepts of Elementary Mathematics (3)

Rational and real number systems, probability and statistics; informal metric and nonmetric geometry; selected topics from algebra and analysis. 3 lectures. Prerequisite: MAT 205.

AREA B.

BIO 110 Life Science (3) FWSpSu

Biological implications in the modern world. The relation of biology and technology to problems in population, reproduction, heredity, evolution, and conservation. Designed for all majors other than Biological Sciences, Agriculture, and Physical Education. 3 lectures. *Armentrout, Brum, Castro, Quinn.*

AREA C.

*** SCI 210, 211, 212 Physical Science (4) (4) (4)**

The basic elements of physics, chemistry, and the earth sciences taught in an interdisciplinary manner. Laboratory sessions emphasize fundamental experiments that will be particularly useful for elementary school teachers. 3 lectures, 1 three-hour lab. Courses must be taken in sequence.

CATEGORY III—Arts, Literature, Philosophy, and Foreign Languages (12 units)

Students are required to take at least one course from each area. A minimum of 12 units must be completed and 4 units of these may be upper division selected from packages in Section VII.

A. *ARTS*

ART 110 The Visual Arts (4)

Introduction to the visual arts. A comprehensive survey/analysis to foster appreciation and understanding of traditional and experimental art forms as they relate to human needs. 4 lectures.

ART 211 History of Tribal Arts (4)

Art of tribal cultures—African, Oceanic, North American Indian—within context of religious beliefs and social function. 4 lectures.

ART 212 History of Western Art (4)

Comprehensive survey and analysis of the development of art in Western civilizations from prehistoric times to the Renaissance. 4 lectures.

ART 213 History of Western Art (4)

Comprehensive survey and analysis of the development of art in Western civilizations from the Renaissance to the 18th century. 4 lectures.

ART 214 History of Western Art (4)

Comprehensive survey and analysis of the development of art in Western civilization from the 18th to the 20th centuries. 4 lectures.

ART 215 History of Art of the United States (4)

Survey of the art of the United States from colonial times to the present. European tradition, frontier art forms, regionalism, social realism, international art style. 4 lectures.

ART 219 Art of Mexico and the Southwest (4)

The arts of pre-Columbian Mexico, the Spanish Conquest, and the colonial period of Mexico to the present; the American Southwestern Indian arts. 4 lectures.

COM 241 Introduction to the Film (4)

The development of the motion picture as an art form and medium of mass communication. Critical appreciation and analysis of the film. 2 lectures, 2 two-hour activities.

DR 203 Introduction to the Theatre (4)

Theatre as a performing art. The study of representative plays as they illustrate questions of structure and interpretation as well as elements of theatre production and management. 4 lecture-discussions. Prerequisite: ENG 104 or permission of instructor.

MU 100 Music Fundamentals (4)

Introduction to music theory for the general university student. Notation, rhythm, melody, scales, keyboard work. No previous experience required. 4 lectures.

MU 104 Survey of Music (4)

Introduction to the great composers in Western civilization and their music. Basic forms, styles, and aesthetics of music. Records, films. 4 lectures. No previous experience required.

MU 215 Music Cultures of the World (4)

Study of music from the major culture areas of the world utilizing the methods and approach of ethnomusicology. An introduction to the music of non-Western culture and folk traditions. Films and live performance. 4 lectures.

MU 216 Music of India (4)

Survey of the important North and South Indian styles, forms and genres of music, and their functions in Indian culture. Musical studies related to aesthetic values of the culture. 4 lectures.

MU 217 Music of East Asia (4)

The musics of China, Korea, and Japan as discrete entities reflecting indigenous traditions, and compartively, displaying common influences. Study of general cultural considerations emphasizing the place of music in each. 4 lectures.

PE 202 Introduction to Dance (4)

A course designed to create an understanding of all dance activities through rhythmic participation, field trips, and audio-visual experiences. 3 lecture, 1 two-hour activities.

ENV 112 Meaning of Architecture (4)

How buildings and architects influence our lives. Understanding the functions of architecture, including the principles of design, choice and property of materials, human needs. Exploring simple design issues through case study applications. Historic overview of architecture, progress in building technology and energy efficient materials and design, and the potential impact on the future. 2 two-hour lectures. Not open to Arc majors. W.

B. *PHILOSOPHY AND HISTORY*

PHL 151 Lower Division Seminar (1)

An open forum of students interested in introduction to Philosophy who desire to do special research on a topic chosen in consultation with the instructor. Written report required. 1 lecture-discussion.

PHL 201 Introduction to Philosophy (4)

Investigation of basic concepts and methods of philosophy; selected metaphysical, epistemological, ethical, aesthetic, and logical problems and issues traditional to philosophy, with emphasis on their relevance for intelligent living. 4 lecture-discussions.

PHL 203 Introduction to the History Philosophy (4)

Major figures and themes in the history of Western philosophy, including not only their contributions to the development of philosophy, but also their influence on the arts, sciences, and literature. 4 lecture-discussions.

PHL 204 Ethics (4)

The implications of ethics and ethical systems. The meaning of right and wrong, good and bad, obligation. Sanctions and sources of morality. Inquiry into the principles of the morality of human actions. Ethical foundations of personal and social relations. 4 lecture-discussions.

PHL 205 Business and Professionals Ethics (4)

Analysis of current crises in business and professional ethics including kickbacks, bribes and whistleblowing examined in the light of contemporary ethical theory. 4 lecture-discussions.

PHL 210 World Religions: Oriental (4)

Living religions of India, China, and Japan; men, movements, and ideas and their relevance to modern man, including developments in the 20th century. 4 lecture-discussions.

PHL 211 World Religions: Mediterranean World (4)

Living religions of the Mediterranean world: Zoroastrianism, the Hebrew-Jewish religion, Christianity, Islam; men, movements, and ideas, including developments in the 20th century. 4 lecture-discussions.

HST 101 History of Civilization: The Ancient World (4)

Origin and development of civilization in Eurasia including Mesopotamia, Egypt, India, China, Israel, Greece and Rome. Integrative study of ancient political, economic, and social organizations, technological achievements, and mythological, religious, and artistic expressions. 4 lecture-discussions.

HST 102 History of Civilization: The Middle Period (4)

Cross cultural study of Western Christendom, Byzantium, Islam, India, East Asia, Africa and Americas. Impact of Central Asian nomads on Eurasian civilizations. Medieval origins of European science and technology. European Renaissance, Reformation, and expansion into Africa, Asia, and Americas. 4 lecture-discussions.

C. *LITERATURE AND FOREIGN LANGUAGES*

Literature

ENG 201 Introduction to Modern Fiction (4)

Readings chiefly in the 20th-century short story and novel, with emphasis on man's search for knowledge, self-understanding, and values. For majors other than English. 4 lectures. Prerequisite: Eng 104 or equivalent.

ENG 202 Introduction to Poetry/Modern Drama (4)

Readings in either poetry or 20th century drama, specific offerings to be determined by instructor. Emphasis on man's search for knowledge, self-understanding, and values. For majors other than English. 4 lectures. Prerequisite: ENG 104 or eqivalent. May be repeated once for credit.

ENG 203 Introduction to Shakespeare (4)

Selected plays from the works of Shakespeare. For majors other than English. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 204 Modern Fiction for Foregin Students (4)

Readings chiefly in the 20th-century short story and novel, with emphasis on man's search for knowledge, self-understanding, and values. For majors other than English. Equivalent to ENG 201. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 205 Black Literature in America (4)

Analysis and evaluation of the works of major Black writers in America—from Phillis Wheatley to the present—in the light of cultural, political and social history. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 206 Contemporary Literature (4)

Readings, primarily novels, of important contemporary writers. Emphasis on controversial moral, social, and cultural issues. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 207, 208 Survey of British Literature (4) (4)

British literature, as exemplifying the history of ideas, from its beginning to the present, with emphasis on the major works. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 211, 212 Survey of American Literature (4) (4)

Philosophical, religious, political, and literary ideas in American writing from Colonial times to the present. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 215 Ethnic Literatures of America (4)

Works by and about such minorities as the American Indian and the Mexican-American, emphasis to be determined by the instructor. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

ENG 216 The Bible as Literature (4)

Old and New Testament narrative, poetry, and wisdom literature in the King James Version. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 217 Western Literary Heritage (4)

Readings in literature of the ancient world from the beginning to the 6th century after Christ, with emphasis on the history of ideas. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 218 Western Literary Heritage (4)

Readings in medieval and Renaissance literature from the 6th through the 16th centuries, with emphasis on the history of ideas. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 222 The Literature of Science Fiction (4)

Science fiction as a literary genre. The history of science fiction. Seminal works (novels and short stores); major writers. The significance of science fiction in contemporary life and thought. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

ENG 231 Introduction to Folklore (4)

Introduction to folklore. Narrative, song, folklife, ballads, customs, beliefs, games, folk speech, and other genres. Collecting. Significance of folkloric phenomena in life and literature. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

***Foreign Languages*—All elementary and intermediate level foreign language coursework offered by the university is included in this area.**

CATEGORY IV—Social Sciences

Students are required to take at least one course from each area. A minimum of 12 units must be completed and 4 units of these may be upper division selected from packages in Section VII.

A. *Economic*

EC 201 Principles of Economics (4)

Introduction to microeconomics. How an economic system works to solve the problems of choice among alternative allocations, utilizations, and distributions of resources. Applications of economic principles to domestic and international economic problems. 4 lecture-discussions.

EC 202 Principles of Economics (4)

Introduction to macroeconomics. Determinants of national income, output, employment, and price levels. Monetary and fiscal policy. International economics. Applications of economic principles to domestic and international economic problems. 4 lecture-discussions.

FRL 100 Personal Money Management (4)

Analysis of the functions and concepts of financial management as applied to persons, business, real estate and investments. Includes examination of cash flow, sources of funds, capital investments, private investments and security market theory. Not open to finance majors. 4 lecture-discussions.

MHR 104 Starting Your Own Business (4)

Identification and comparison of characteristics found in persons who are successful in starting a new business. Investigation of an independent business as a career choice. Steps taken and problems encountered in planning new business ventures. 4 lecture-discussions.

MKT 201 The Consumer, Marketing and Society (4)

Overview of the marketing system as it applies to the needs/wants of consumers. Designed to assist the individual to become an informed and efficient consumer. Discusses advertising, personal selling, pricing and product characteristics as they affect the individual. Consideration of the role of government in consumer affairs. 4 lecture-discussions.

OM 103 Business and Its Environment (4)

American business system in its economic and social environment. A conceptual approach relating business and its legal forms to society as a whole. Career opportunities in business with emphasis on management. 4 lectures.

ABM 101 Introduction to Agricultural Business (4)

Agricultural business structure and scope of operations. Principles of operations and financing. Seminar discussions. 4 lectures.

IA 101 World Agricultural Resources (4)

Resource base for agricultural production on various continents. Potential for increasing food supplies. Role of agriculture in economic development. 4 lectures.

SSC 101 Introduction to Social Sciences (4)

An analysis of each of the many disciplines comprising the social sciences with particular emphasis on their interrelationships. A study of source materials and library techniques as well as methods employed by social scientists. 4 lecture-discussions. (May be taken to meet only one area)

B. *Social*

ANT 102 Introduction to Cultural Anthropology (4)

The nature of culture and cultural phenomena; comparative social organization; religion and value systems of non-literate and folk peopoles; cultural and psychological processes in the development of personality. 4 lecture-discussions.

GEO 102 Cultural Geography (4)

Basic principles of cultural geography. Significance of people-related distribution patterns with reference to their effect on man's activities. 4 lecture-discussions.

SOC 201 Principles of Sociology (4)

Sources of materials and methods of sociological study. Concepts and principles; including contemporary social theory, elementary forms of social organization, culture and socialization. 4 lecture-discussions.

SOC 206 Family Relations (4)

Analysis of dating, courtship, engagement; religious, social and legal factors relating to marriage and early adjustment. Preparation for marriage. 4 lectures.

SW 201 Introduction to Social Work (4)

A survey of the historical development of social welfare. Emphasis on a survey of social welfare philosophies and trends. 4 lectures.

REC 125 Leisure Life Styles (4)

Exploration of current research identifying the socio-psychological basis of leisure. Affective factors influencing development of a leisure life style philosophy; leisure needs assessment; leisure time as a resource. 4 lectures.

EWS 140 Introduction to Ethnic Studies (4)

Survey of scholarship appropriate to ethnic studies; analyses of the changing social and cultural characteristics of American Indians, Blacks, and Chicanos in the society of the United States. 4 lecture-discussions.

EWS 145 Introduction to the Study of Women (4)

Survey of the perceived culture-historic and changing roles of women in U.S. society; questions of feminism and liberation. 4 lecture-discussions.

EWS 201 Afro-American Experience (4)

Focuses on the Afro-American heritage in the United States with emphasis on the historical, political, educational, economic and social roles of Blacks in American society. 4 lectures.

EWS 202 Chicano Hispanic Experience (4)

Survey of various aspects of Chicano and Hispanic experiences and the formation of ideological perspectives; effects of the family, peer groups, social class, education and racism on identity development. 4 lectures.

EWS 203 American Indian Experience (4)

Relevance of being Indian in the modern world; Indian understanding of American history and culture, Indian contributions to American history. 4 lecture-discussions.

EWS 204 Southeast Asian-Pacific Experience (4)

An introduction to the experience of being a Southeast Asian-Pacific islander in America. Special focus on the historical/sociological/cultural analysis of the origins of the Asian/Pacific peoples in the United States. A comparative perspective will be emphasized. 4 lectures.

SSC 101 Introduction to Social Sciences (4)

An analysis of each of the many disciplines comprising the social sciences with particular emphasis on their interrelationships. A study of source materials and library techniques as well as methods employed by social scientists. 4 lecture-discussions. (May be taken to meet only one area)

C. *Political and Historical*

PLS 202 Comparative Political Systems (4)

Introductory comparative analysis of both Western and non-Western politics and government. Relevance of such concepts as political culture, political socialization, and political ideologies to the understanding of political systems. 4 lecture-discussions.

PLS 204 Introduction to Political Thought (4)

Basic conceptions and principles of normative political theory. 4 lecture-discussions.

HST 103 History of Civilization: The Modern World (4)

Analysis of rise of sovereign and national state, capitalist and industrial economy, scientific and secular culture in Europe; revolution in traditional society, values, and culture. Western Imperialism and revolt of Third World. 4 lecture-discussions.

HST 201 United States History (4)

A survey of the history of the United States from earliest exploration to the present with emphasis on the political, social, and economic trends and episodes which have molded the modern American nation. 4 lecture-discussions.

ENV 113 Cities, Citizens, and Urban Planning (4)

Factors causing changes in the city. Planning in government, private interest groups and the opportunities for citizen participation in shaping urban form. Understanding the processes of plan-

ning and design. Students will learn the roles of citizen, politician and planning official in urban growth and development and will learn how to personally contribute to the improvement of the American urban environment. 2 two-hour lectures. Not open to UP majors. SP (Formerly UP 211)

COM 203 History of Mass Communications (4)

History, background, and responsibilities of the mass media. Emphasis on development of mass communication in the United States. 4 lectures.

SSC 101 Introduction to Social Sciences (4)

An analysis of each of the many disciplines comprising the social sciences with particular emphasis on their interrelationships. A study of source materials and library techniques as well as methods employed by social scientists. 4 lecture-discussions. (May be taken to meet only one area)

CATEGORY V—The Integrated Being (4 units)

Students must select one course from the list below to meet this category.

CPU 201 Exercise, Nutrition and Fitness for Modern Society (4)

Importance of good nutrition, circulorespiratory and muscular endurance, strength and flexibility for adult health. Role of exercise and nutrition in control/prevention of cardiovascular disease, obesity and stress-related illness. Rationale for and participation in various adult fitness activities. 3 lectures, 2 one-hour activities.

CPU 202 Health, Nutrition and the Integrated Being (4)

Investigation of specific areas of the integrated being dealing with nutrition, stress, drugs, sexuality, major health problems and death and dying. Understanding their effect on "the integrated being" and the development of behaviors and actions that will promote optimum physical and mental health. 4 hours, lecture.

CPU 210 Actualized Living (4)

Lifelong physiological and socio-psychological aspects of the leisure phenomenon. Experience in assessing student's leisure knowledge and habits coupled with a comprehensive leisure counseling follow through. Includes a one unit component in death and dying. 2 lectures, 1 lecture-discussion, 1 two-hour activity.

PSY 201 General Psychology (4)

Exploration and application of basic psychological principles in understanding self and relationships with others. Stages of psychological development and personality. Psychological approaches to interpersonal relations; effective and ineffective living. Therapeutic methods of intervention; social resources in prevention of maladaptive behavior. 4 lecture-discussions.

CATEGORY VI—U.S. History, Constitution, and American Ideals (8 units)

Students must select one course from each group to meet this category.

Group 1

AMC 201 American Civilization (4)

Analysis of American institutions; emphasis on the constitutions and governments of California and the United States; rights, obligations and powers of citizens; key social, cultural, economic values and ideals which shape the unique American character. Meets state graduation requirement in U.S. Constitution and Government and U.S. Ideals and Institutions. 4 lecture-discussions.

PLS 201 Introduction to American Government (4)

U.S. and California Constitutions and political philosophies of their framers; intergovernmental relations; political institutions and processes; rights and obligations of citizens. Meets state graduation requirement in U.S. Constitution and Government and U.S. Ideals and Institutions. 4 lecture-discussions.

Group 2

AMC 202 American Civilization (4)

Analysis of the American experience and institutions; their derivation from other cultures; significant historical events since the country's inception; role of major ethnic and social groups; relationships with external regions and powers; the development of the American Character; ideals and

values of American civilization. Meets state graduation requirements in U.S. History and American Ideals. 4 lecture-discussions.

HST 202 United States History (4)

A survey of the history of the United States from earliest exploration to the present with emphasis on the political, social, and economic trends and episodes which have molded the modern American nation. Meets state graduation requirements in U.S. History and American Ideals. 4 lecture-discussions.

CATEGORY VII—Upper Division General Education (Subject to Change)

Note: Each upper division course package is given a title and is labeled as either depth or theme. When lower division units are replaced in areas II, or III, or IV by upper division units in the package, the area is designated. If more than one area or subcategory is given, students may decide which one they wish to use. Course prerequisites are given after each course entry. Course descriptions listed in catalog departmental sections.

Explanation of Symbols
NP = no prerequisites
UDS = upper division standing

School of Agriculture (Designated upper division packages by major)

Major

Agriculture Biology

Depth + 4: Small Business Management IV-A

ABM 324 Mgmt Accounting (4) (NP)
PSY 314 Human Relations (4) (UDS)
BOT 323 Plant Pathology (4)—BOT 124 or BOT 125

Agriculture Engineering

Depth: Mechanical Engineering

ME 301 Thermodynamics (4)—PHY 132, MAT 215
ME 311 Fluid Mechanics (3)—ME 215, PHY 132 concurrent MAT 215
IE 405 Engineering Econ (4)—Jr. standing in engineering courses.
ME 312 Fluid Mechanics (4)—ME 301, ME 311—corequisite ME 231

Agriculture Science/Vocation Agriculture

Depth: Personality Development IV-C

PSY 334 Cognitive Processes (4)—PSY 201 or PSY 202
PSY 340 Educational Psychology (4)—PSY 201 or PSY 202
PSY 402 Theories of Learning (4)—PSY 201 or PSY 202 and Jr. standing

Agronomy

Depth + 4: Advanced Biology IV-A

BIO 303 Genetics (4)—BIO 110 or BIO 115
BOT 323 General Plant Pathology (4)—BOT 124 or BOT 125
ABM 324 Mgmt Accounting (4) (NP)

Animal Science

Depth + 4: Advanced Biology

BIO 303 Genetics (4)—BIO 110 or BIO 115
CHM 321 Elements of Biochemistry (4)—CHM 201 and CHM 250 or CHM 212 and CHM 251

OR

CHM 327 Biochemistry (4)—CHM 212 and CHM 251
ABM 328 Ag Enterprise Mgmt (NP) (CAT IV, A)

Foods and Nutrition

Depth + 4: Biochemistry and Food

CHM 321 Elements of Biochemistry (4)—CHM 201 and CHM 250 or CHM 212 and CHM 251

MIC 320 Food Microbiology (4)—MIC 201, CHM 201 and CHM 250
AS 327 Meat Utilization (4) (NP) (CAT II, 2, D)

Fruit Industries

Depth + 4: Advanced Botany IV-A

BOT 323 General Plant Pathology (4)—BOT 124 or BOT 125
BOT 422 Plant Physiology (4)—BOT 124 and CHM 105
ABM 324 Mgmt Accounting (4) (NP)

Home Economics

Depth: Family Development IV-C

PSY 310 Child Psychology: Early Childhood (4)—PSY 201 or PSY 202
SOC 321 Family as Social Institution (4)—SOC 201, SOC 202 or permission of instructor
HST 416 History of Women in the U.S. (4)—Jr. standing or permission of instructor

Ornamental Horticulture

Depth: Plant/Soil Relations

BOT 422 Plant Physiology (5)—BOT 124, CHM 105
BOT 323 General Plant Pathology (4)—BOT 124 or BOT 125
SS 439 Soil Materials (3)—SS 231 (CAT II, 2, D)

Park Administration

Depth + 4: Business/Accounting

FRL 312 Business Law (4) (NP)
ABM 324 Mgmt Accounting (4) (NP)
REC 306 Recreation Mgmt in Urban Settings (4)—REC 126, REC 132, REC 221 or permission of instructor (CAT IV, B)

Soil Science

Depth + 4: Advanced Botany IV-A

BOT 323 General Plant Pathology (4)—BOT 124 or BOT 125
BOT 422 Plant Physiology (5)—BOT 124, CHM 211 or CHM 105
ABM 324 Mgmt Accounting (4) (NP)

School of Business Administration (Suggested for all majors and options in school)

All Departments

MHR 318 Introduction to Organizational Behavior (4) UDS or permission of instructor (IV-B) and any two of the following:

COM 321 Communication Problem Analysis (4) UDS
SP 301 Human Communication Theory (4) SP 100 or SP 204
SP 307 Group Discussion (4) UDS
SP 309 Small Group Communications (4) SP 307 or PSY 314

OR

MHR 318 Introduction to Organizational Behavior (4) UDS or permission of instructor (IV-B) and any two of the following:

COM 302 Advertising Copywriting, Layout and Production (4) COM 206
COM 311 Public Relations Techniques (4) COM 102, 313
COM 313 Public Relations Theory (4) ENG 105 or COM 216
COM 413 Public Opinion Propaganda Mass Media (4) UDS

Additional upper-division packages approved for all School of Business departments are (Descriptions listed in Section II-D below)

The African Experience
The Afro-American Experience
California Studies
The Chicano/Hispanic Experience

The Ethnic Experience in America
The First Americans: American Indians
Latin America
Mexico
Moral Values in A Complex World
Opinion in a Democratic Society
The Soviet Union
Urban Studies
Women in Comparative Perspective

Other upper-division packages may be designated at departmental option.

School of Engineering (Designated by major)

Aerospace Engineering—10 Unit Depth (Math), plus 4 units

MAT 316 Applied Differential Equations (4)
MAT 317 Laplace Transforms and Fourier Series (3) MAT 216 or consent of instructor
MAT 318 Math Analysis of Eng. problems (3) MAT 216 or consent of instructor

AND

IE 405 Engineering Economics (4)—Junior standing in engineering courses (CAT IV-A)

Chemical and Materials Engineering—14 Unit Depth (Chemistry), (II-B)

CHM 311 Physical Chemistry (4) MAT 216, CHM 106 or 113, and one year of college physics
CHM 312 Physical Chemistry (3) MAT 216, CHM 106 or 113, and one year of college physics
CHM 313 Physical Chemistry (3) MAT 216, CHM 106 or 113, and one year of college physics
CHE 432 Pollution Abatement (4) CHM 213 and senior standing in engineering courses

Civil Engineering—12 Unit Theme

Theme: "Architectural Coherence in an Urban Environment"

CE 301 Technological Economics (4)
ESC 321 Geology for Engineers (4) CE 135
ARC 451 Theory of Architecture (4) UDS (III-A)

Electrical and Computer Engineering—8 Unit Depth in the Applied Sciences, plus 4 units in II-D

8 Depth: **Applied Science**

PHY 333 Thermal Physics (4) PHY 122 or 132, MAT 216
OR ME 301 Thermodynamics (4) PHY 132, MAT 215
OR CHE 311 Momentum Transport (4) MAT 216
AND at least 4 units from the following list of advanced science courses:

CHM 304 Elements of Physical Chemistry (4) CHM 113, MAT 116, PHY 133
ESC 300 Introduction to Geochemistry (4) ESC 111 and one year of college chemistry
ESC 335 Physical Oceanography (3) UDS
ESC 360 Groundwater Geology (4) ESC 111 with lab, college level math and physics coursework
PHY 302 Geometrical Optics (3) PHY 122 or 132
PHY 321 Mechanics (4) PHY 133 and MAT 216
PHY 406 Solid State Physics (4) PHY 133 and MAT 215
PHY 407 Statistical Physics PHY 235, 333 and MAT 215 (4)
PHY 417 Physical Optics (4) PHY 122 or 132, MAT 116

AND

4—ECE 315 Probability and Statistics for Engineers. (4) MAT 216
or STA 315 Probability and Statistics for Engineers. (4) MAT 216

If ECE 315 is chosen, the Student must take PHY 333 as part of the Depth Package.

Engineering Technology—3 Options

Option I—12 Unit Depth—Resource Management (IV-A)

ETT 305 Engineering Economics Analysis of ET (4) MAT 105
OM 307 Management Principles and Theory (4) UDS
EC 435 Environmental and Resource Economics (4) EC 201, 202 or permission of instructor

Option II—12 Unit Depth—Human Relations (IV-B)
PSY 314 Human Relations (4) UDS
PSY 315 Human Relations (4) PSY 314
PSY 332 Industrial and Personnel Psychology (4) UDS
Option III—12 Unit Depth—Management Science and Production (IV-B)
OM 307 Management Principles and Theory (4) UDS
OM 313 First Line Management (4)
OM 421 Policies of Industrial Relations (4) Senior standing and consent of instructor

Industrial and Manufacturing Engineering—8 Unit Depth, plus 4 (IV-A)
Depth: Applied Science and Math
MAT 316 Differential Equations (4)
Advanced Science Elective—Choose one of the following:
BIO 300 Human Heredity (4) BIO 110
BIO 305 Ecology for Environmental Eng. (4) BIO 110
BOT 307 Plants and People (4) UDS
BOT 316 Plant Environments (4)
ESC 335 Physical Oceanography (3) UDS
PHY 340 Energy in the Environment (4) PHY 122 or 132 or consent of instructor
PHY 410 Biophysics (3) PHY 123 or consent of instructor

AND
IE 405 Engineering Economics (4) Junior standing in Engineering courses

Mechanical Engineering—8+ Unit Depth, plus 4 (IV-A)
Depth: Applied Science and Math
MAT 316 Differential Equations (4)

AND at **LEAST** 4 units from the following list of advanced Science courses:
BIO 303 Genetics (4) BIO 110 or 115
BIO 305 Ecology for Environmental Engineers (4) BIO 110
BIO 460 Air Pollution Problems (3) Senior standing and consent of instructor
ESC 303 Climatology (3) UDS
ESC 304 Meteorology (3) PHY 121 or consent of instructor
ESC 321 Geology for Engineers (4) CE 135
ESC 335 Physical Oceanography (3) UDS
ESC 351 Petroleum Geology (3) ESC 111 or 112
ESC 415 Engineering Geology (4) ESC 321 or ESC 111
PHY 302 Geometrical Optics (3) PHY 122 or 132
PHY 313, 314, 315 Physics of Electric and Magnetic Phenomena (3,3,3) PHY 133, MAT 215, 216
PHY 333 Thermal Physics (4) PHY 122 or 132, MAT 216
PHY 340 Energy and the Environment (4) PHY 122 and 132
PHY 406 Solid State Physics (4) PHY 133, MAT 215
PHY 410
(BIO 410) Biophysics (3) PHY 123 or consent of instructor
PHY 412 Mathematical Methods of Physics (4) MAT 216
PHY 417 Physical Optics (4) PHY 122 or 132, MAT 116
PHY 420 Acoustics (3) PHY 132, MAT 215, 216

AND
IE 405 Engineering Economics (3) Junior standing in Engineering courses (IV-A)

School of Science (One department only)

Depth: For CS majors only.
ECE 353 Computer Electronics I (4) PHY 133, CS 210
ECE 354 Computer Electronics II (4) ECE 255
and
STA 330 Applied Probability Theory (4) MAT 215 (II-D)

NON-DESIGNATED BY SCHOOL OR MAJOR (MAY BE TAKEN BY ALL STUDENTS SUBJECT TO DEPARTMENT LIMITATIONS)

Depth: **The African Experience**

ANT 399 Culture Areas of World: Africa (4) ANT 102 (IV-B)
HST 421 Pre-Colonial Africa (4) UDS (IV-C)
HST 423 African Nationalism and Decolonization (4) UDS (IV-C)
GEO 358 Geography of Subsaharan Africa (4) UDS (IV-B)

Theme: **The Afro-American Experience**

EWS 402 Afro-American Contemporary Issues (4) EWS 140 or permission of instructor (IV-B)
DR 302 Black Theatre (3) UDS (III-A)
HST 336 The Black Man in America (4) Junior standing (IV-C)

Depth: **Agricultural Policy in Developed and Developing Nations**

PLS 342 Politics of Developing Nations (4) PLS 201 or AMC 201 (IV-C)
IA 362 Survey of Agricultural Policy in Developing Nations (4) UDS (IV-C)
ABM 313 Agricultural Policy (4) EC 201 or permission of instructor (IV-C)

Theme: **The American Family in Contemporary Perspective**

EWS 330 Ethnicity and Family Life (4) EWS 140, SOC 321 or permission of instructor (IV-B)
HE 420 Family Housing and Environment (4) UDS (II-D)
SOC 321 Family as a Social Institution (4) SOC 201, 202 or permission of instructor (IV-B)

Depth: **Applied Social Research (IV-B)**

PSY 420 Environmental Psychology (4) PSY 201 or 202, Junior standing or permission of instructor
SOC 433 Survey Research (4) UDS
BHS 426 Applied Social, Psychology-Sociology (4) PSY 202, SOC 201, BHS 204, 205 or equivalent, or permission of instructor

Depth: **Biology and Humans**

BIO 300 Human Heredity (4) BIO 110 (II-D)
BIO 301 Human Sexuality (4) UDS (II-D)
BOT 307 Plants and People (4) UDS (II-D)

Depth: **California Studies**

Select three courses from the following:

GEO 351 Geography of California (4) UDS (IV-B)
HST 342 History of California (4) UDS (IV-C)
PLS 480 California Politics (4) PLS 201 (IV-B)
ANT 320 Indians of California (4) ANT 102 or permission of instructor (IV-B)

Depth: **The Chicano/Hispanic Experience**

EWS 401 Chicano Contemporary Issues (4) EWS 140 or permission of instructor (IV-B)
HST 435 American Southwest in the 20th Century (4) UDS (IV-C)
PLS 322 The Chicano in the American Political System (4) PLS 201 (IV-C)

Theme: **The Civilization of England in Pre-Modern Era**

HST 330 History of England to 1689 (4) UDS (IV-C)

Select two of the courses from the following

ENG 401 Chaucer (4) 200-level literature class (III-C)
ENG 402 Milton and Contemporaries (4) 200-level literature class (III-C)
ENG 403 Shakespeare (4) 200-level literature class (III-C)
ENG 404 Shakespeare (4) 200-level literature class (III-C)
ENG 440 English Renaissance (4) 200-level literature class (III-C)

Theme: **The Civilization of England in the Modern Era**

HST 331 History of England Since 1689 (4) UDS (IV-C)
HST 332 Great Britain in the Industrial Revolution (4) UDS (IV-C)

and select one:

ENG 442 English Enlightenment (4) 200-level literature class (III-C)
ENG 444 English Romanticism (4) 200-level literature class (III-C)
ENG 448 Victorian Writers (4) 200-level literature class (III-C)

ENG 450 Twentieth Century British Literature (4) 200-level literature class (III-C)

Theme: **Classical Civilization**

HST 319 History of Greece (4) UDS (IV-C)
ART 316 Art of the Classical World (4) UDS (III-A)
PHL 312 History of Ancient Philosophy (4) UDS (III-B)

Depth: **Current Peoples and Problems of Latin America (IV-C)**

HST 306 History of Latin America: Problems of the 20th Century (4) UDS
PLS 444 Politics of Latin America (4) PLS 201 or AMC 201
ANT 399 Cultural Areas of the World: Mesoamerica (4) ANT 102 or permission of instructor

Depth: **Dimensions and Development**

PLS 342 Politics of Developing Nations (4) PLS 201 or AMC 201 (IV-C)
EC 402 Economics Development (4) EC 202 or permission of instructor (IV-C)
IA 362 Agriculture Policy in Developing Nations (4) UDS (IV-A)

Select one course from the following:

HST 306 History of Latin America: 20th Century Problems (4) UDS (IV-C)
HST 312 History of Southeast Asia (4) UDS (IV-C)
HST 423 African Nationalism and Decolonization (4) UDS (IV-C)

Depth: **Earth Science**

ESC 423 Sedimentary Petrology (4) ESC 325 (II-D)
ESC 424 Igneous & Metamorphic Petrology (4) ESC 325 (II-D)
ESC 433 Economic Geology (4) ESC 215 (II-D)

Theme: **Early Modern European Civilization**

HST 322 Early Modern Europe 1450 to 1713 (4) UDS (IV-C)
ART 318 Art of the Italian Renaissance (4) UDS (III-A)
MU 404 Renaissance and Baroque Music (4) MU 104 or equivalent (III-A)

Depth: **The Ethnic Experience in America**

EWS 360 Ethnic Cultures in the United States (4) UDS (IV-B)
PLS 383 Minority Community in Political Dynamics (4) PLS 201 or AMC 201 (IV-C)
EC 497 Economics of Minority Groups (4) EC 202 (IV-A)

Theme: **The First Americans: American Indians**

ANT 321 Indians of North America (4) ANT 102 or permission of instructor (IV-B)
EWS 403 American Indian Contemporary Issues (4) UDS (IV-B)
HST 377 History of the American Indians (4) UDS (IV-C)

OR

PHL 306 American Indian Thought and Religion (4) UDS (III-B)

OR

PHL 307 American Indian Thought and Religion (4) UDS (III-B)

Depth: **Folklore**

ANT 356 The Anthropology of Folklore (4) ANT 102 or permission of instructor (IV-B)
EWS 320 Ethnicity, Folklore and the Fine Arts (4) UDS (IV-B)
ENG 324 Children's Literature (4) 200-level literature class (III-C)

Depth: **Functioning with Labor (IV-B)**

EC 414 Labor Economics (4) EC 202
ABM 308 Agricultural Labor Mgmt Relations (4) UDS
PSY 314 Human Relations (4) UDS

Depth: **Home Environment (II-D)**

HE 420 Family Housing and Environment (4) UDS
HE 325 Household Equipment (4) UDS
HE 342 Home Management (4) UDS

Theme: **Human Culture and Biology** (must total 12 units)

Students are to take at least one course from each group

I. BIO 300 Human Heredity (4) BIO 110 or equivalent (II-D)
BIO 301 Human Sexuality (4) UDS (II-D)

BOT 307 Plants and People (4) UDS (II-D)

II. GEO 312 Economic Geography (4) UDS (IV-B)
ANT 350 Environment, Technology, and Culture (4) ANT 102 or permission of instructor (IV-B)

OR

ANT 357 The Anthropology of Health (4) ANT 101 or 102 or permission of instructor (IV-B)

Theme: **Interpreting Contemporary American Experience**

PLS 320 Political Change in Contemporary America (4) PLS 201 or AM 201 (IV-C)
ENG 456 Twentieth Century American Literature (4) 200-level literature class (III-C)
PHL 320 American Philosophy (4) UDS (III-B)

Depth: **Land Use and Evaluation (IV-C)**

ABM 406 Land Appraisal (4) UDS
EC 419 Land Economics (4) EC 201, 202 or permission of instructor
UP 301 Principles of Urban Planning (4) UDS

Theme: **Latin America**

SPN 310 Latin American Literature (4) SPN 202 or equivalent (III-C)
HST 304 History of Latin America: The Colonial Period (4) UDS (IV-C)
AND (select one)
HST 305 History of Latin America: Era of Nation Building (4) UDS (IV-C)
HST 306 History of Latin America: 20th Century Problems (4) UDS (IV-C)

OR

PLS 444 Latin American Politics (4) PLS 201 or AMC 201 (IV-C)
PLS 454 Inter-American Relations (4) PLS 201 or AMC 201 (IV-C)

Depth: **Latin American History (IV-C)**

HST 304 History of Latin America: The Colonial Period (4) UDS
HST 305 History of Latin America: Era of Nation Building (4) UDS
HST 306 History of Latin America: 20th Century Problems (4) UDS

Theme: **Latin American Studies**

Select three courses (one must be from III-C area)

HST 304 History of Latin America: The Colonial Period (4) UDS (IV-C)
HST 432 History of Brazil (4) UDS (IV-C)
HST 434 History of Mexico (4) UDS (IV-C)
GEO 352 Geography of Latin America (4) UDS (IV-B)
PLS 444 Latin American Politics (4) PLS 201 or AMC 201 (IV-C)
PLS 454 Inter-American Relations (4) PLS 201 or AMC 201 (IV-C)
SPN 304 Literature of Mexico (4) SPN 202 or equivalent (III-C)
SPN 310 Latin American Literature (4) SPN 202 or equivalent (III-C)

Depth: **Legal and Political Economy (IV-C)**

FRL 302 Legal Environment of Business Organizations (4) UDS
PLS 436 Twentieth Century Political Thought (4) PLS 201 or AMC 201
EC 403 Comparative Economic Systems (4) EC 201 or 202

Depth: **Logic and Theory of Numbers (II-D)**

MAT 306 History of Math (4) MAT 215 or consent of instructor
MAT 325 Introduction to Theory of Numbers (4) MAT 105, Junior standing, or consent of instructor
MAT 330 Modern Euclidean Geometry (4) MAT 105, Junior standing, or consent of instructor

Theme: **Love and Human Sexuality**

BIO 301 Human Sexuality (4) UDS (II-D)
PSY 455 Human Sexual Behavior: Relationships (4) BIO 301 or permission of instructor (IV-B)
PHL 465 Philosophy of Love and Sex (4) UDS (III-B)

Theme: **Medieval Civilization**

PHL 313 History of Medieval Philosophy (4) UDS (III-B)
ART 317 Art of the Middle Ages (4) UDS (III-A)

HST 321 Medieval Europe (4) UDS (IV-C)

Theme: **Mexico**

SPN 304 Literature of Mexico (4) SPN 202 or equivalent (III-C)
HST 434 History of Mexico (4) UDS (IV-C)
GEO 362 Geography of Middle America (4) UDS (IV-B)

OR

GEO 367 Geography of Mexico (4) UDS (IV-B)

Theme: **Nineteenth Century America**

HST 324 Europe in the 19th Century (4) UDS (IV-C)

Select two courses from the following:
PHL 319 Nineteenth Century Philosophy (4) UDS (III-B)
ENG 446 Nineteenth Century Novel (4) 200-level literature class (III-C)
ART 312 Foundations of Modern Art (4) UDS (III-A)
MU 405 Classic and Romantic Music (4) MU 104 or equivalent (III-A)

Depth: **Opinion in a Democratic Society**

PLS 425 Political Behavior (4) PLS 201 or AMC 201 (IV-C)
SOC 433 Survey Research (4) UDS (IV-B)
COM 413 Public Opinion, Propaganda, and the Mass Media (4) UDS (IV-C)

Theme: **Philosophy and History of Science**

At least one course from each group:

I. HST 351 History of the Scientific Revolution (4) UDS (IV-C)
SCI 450 Philosophic Implications of Science (4) Sr. standing in one of the natural or physical sciences, mathematics, or consent of instructor (II-D)

II. BIO 436 History and Philosophy of Biology (4) UDS (III-B)
CHM 306 History and Philosophy of Chemistry (4) Junior standing (II-B)
PHY 306 History of Physics (3) UDS (II-D)
MAT 306 History of Mathematics (4) MAT or consent of instructor (II-D)

Depth: **Plant Pathology and Crop Diseases I (II-D)**

BOT 323 General Plant Pathology (4) BOT 124 or 125
BOT 425 Mycology (4) BOT 120 or 125 or consent of instructor
BOT 426 Mycology (4) BOT 120 or 125 or consent of instructor

Depth: **Plant Pathology and Crop Diseases II**

(Note: Students will have to select 1 additional upper division unit to meet the 12 unit requirement) (II-D)

BOT 323 General Plant Pathology (4) BOT 124 or 125
BOT 424 Advanced Plant Pathology (4) BOT 323
BOT 423 Plant Nematology (3) BIO 115

Depth: **Plant Pathology and Crop Diseases III (II-D)**

BOT 323 General Plant Pathology (4) BOT 124 or 125
AGR 421 Crop Diseases (4) BOT 323
OH 427 Ornamental Plant Diseases (4) BOT 323

Depth: **The Political Process (IV-C)**

PLS 421 Legislative Process (4) PLS 201 or AMC 201
PLS 422 Executive Process (4)
PLS 423 Judicial Process (4)

Depth: **Politics and Peoples of Developing Nations (IV-C)**

PLS 342 Politics of Developing Nations (4) PLS 201 or AMC 201
ANT 399 Culture Areas of World: Mesoamerica (4) ANT 102 or permission of instructor
ANT 399 Culture Areas of World: Africa (4) ANT 102 or permission of instructor (IV-C)

Theme: **Race Relations in America**

EWS 420 Racism and Sexism (4) EWS 140, 145 or permission of instructor (IV-B)
PHL 309 Contemporary Ethical Problems (4) UDS (III-B)
SOC 320 Ethnic Relations in America (4) SOC 201, 202 (IV-B)

Depth: **Sex Roles in America (IV-B)**

BHS 328 Women and Men: Changing Sex Roles (4) SOC 201 or 202
EWS 380 Women in Contemporary Society (4) UDS
MHR 406 Changing Managerial Sex Roles (4) UDS

Depth: **The Soviet Union**

HST 420 The Soviet Union Since 1917 (4) UDS (IV-C)
GEO 353 The Soviet Union: Environment and People (4) UDS (IV-B)
PLS 447 Soviet Government and Politics (4) PLS 201 or AMC 201 (IV-C)

Depth: **Special Populations: Physically and Mentally Disabled (IV-B)**

SSV 312 The Developmentally Disabled Child (4) Permission of instructor (IV-B)
REC 314 Recreaton and Special Populations (IV-B)
SW/REC 324 Handicapped Populations (IV-B)

Theme: **Twentieth Century European Civilization**

Students must choose courses from both categories:

I. HST 336 Europe in the 20th Century (4) UDS (IV-C)
PLS 436 Twentieth Century Political Thought (4) PLS 201 or AMC 201 (IV-C)

II. ART 313 Art of the 20th Century (4) ART 312 (III-A)
MU 406 Twentieth Century Music (4) MU 405 (III-A)
PHL 315 Contemporary Philosophy (4) UDS (III-B)

Depth: **Urban Studies**

Select three courses from the following:
(two of which are outside your major school.)

GEO 315 Urban Geography (4) UDS (IV-B)
UP 301 Principles of Urban Planning (4) UDS (IV-C)
SOC 401 Urban Sociology (4) Junior standing or permission of instructor (IV-B)
EC 432 Urban Economics (4) EC 201, EC 202 or permission of instructor (IV-A)
UP 410 Evolution of the City (4) UDS (IV-C)

OR

UP 411 Evolution of the City (4) UDS (IV-C)

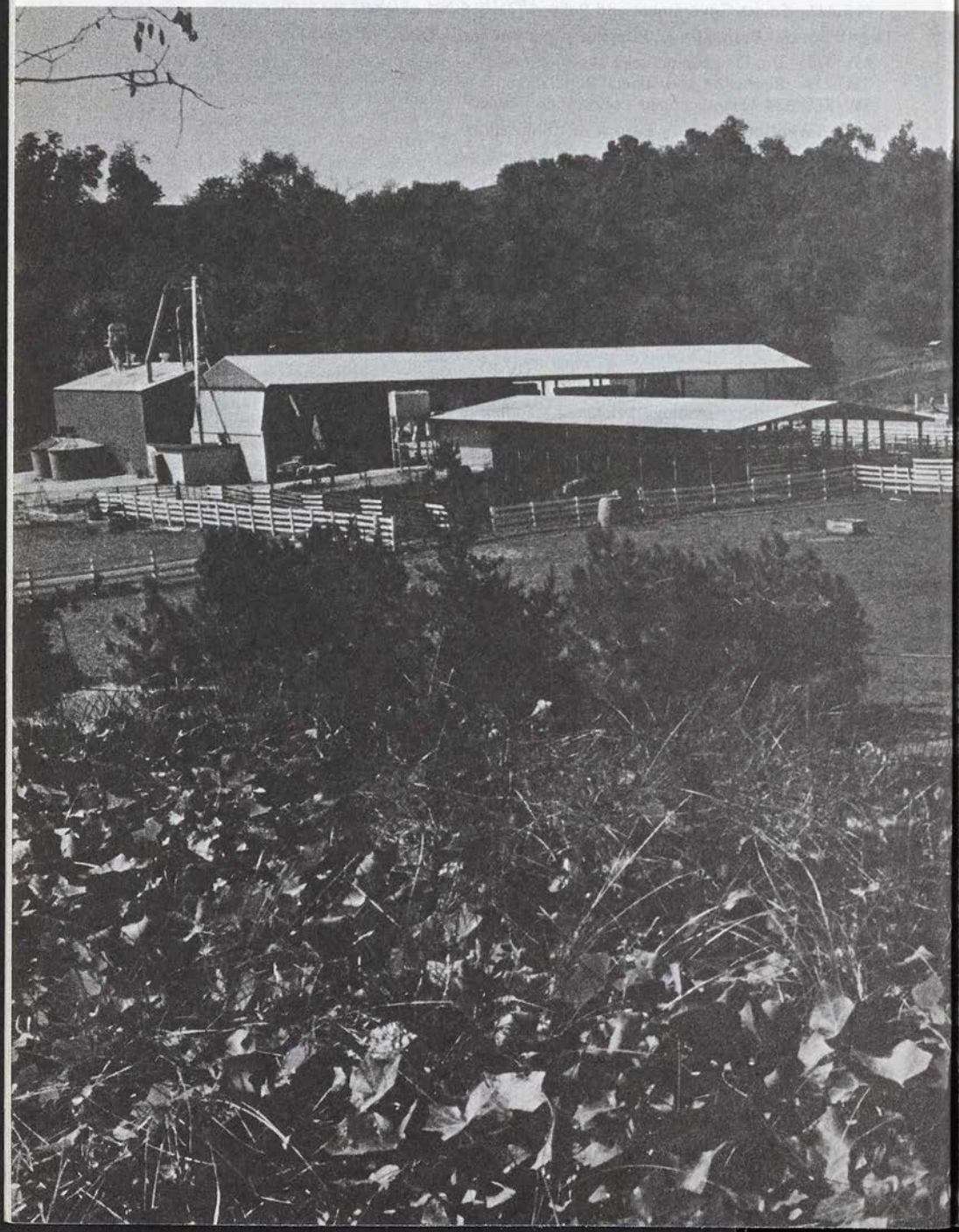
Depth: **Weather**

ESC 300 Introduction to Geochemistry (4) ESC 111 and one year of college chemistry (II-D)
ESC 303 Climatology (3) UDS
ESC 304 Meteorology (3) PHY 121 or consent of instructor (II-D)
ESC 335 Physical Oceanography (3) UDS (II-D)

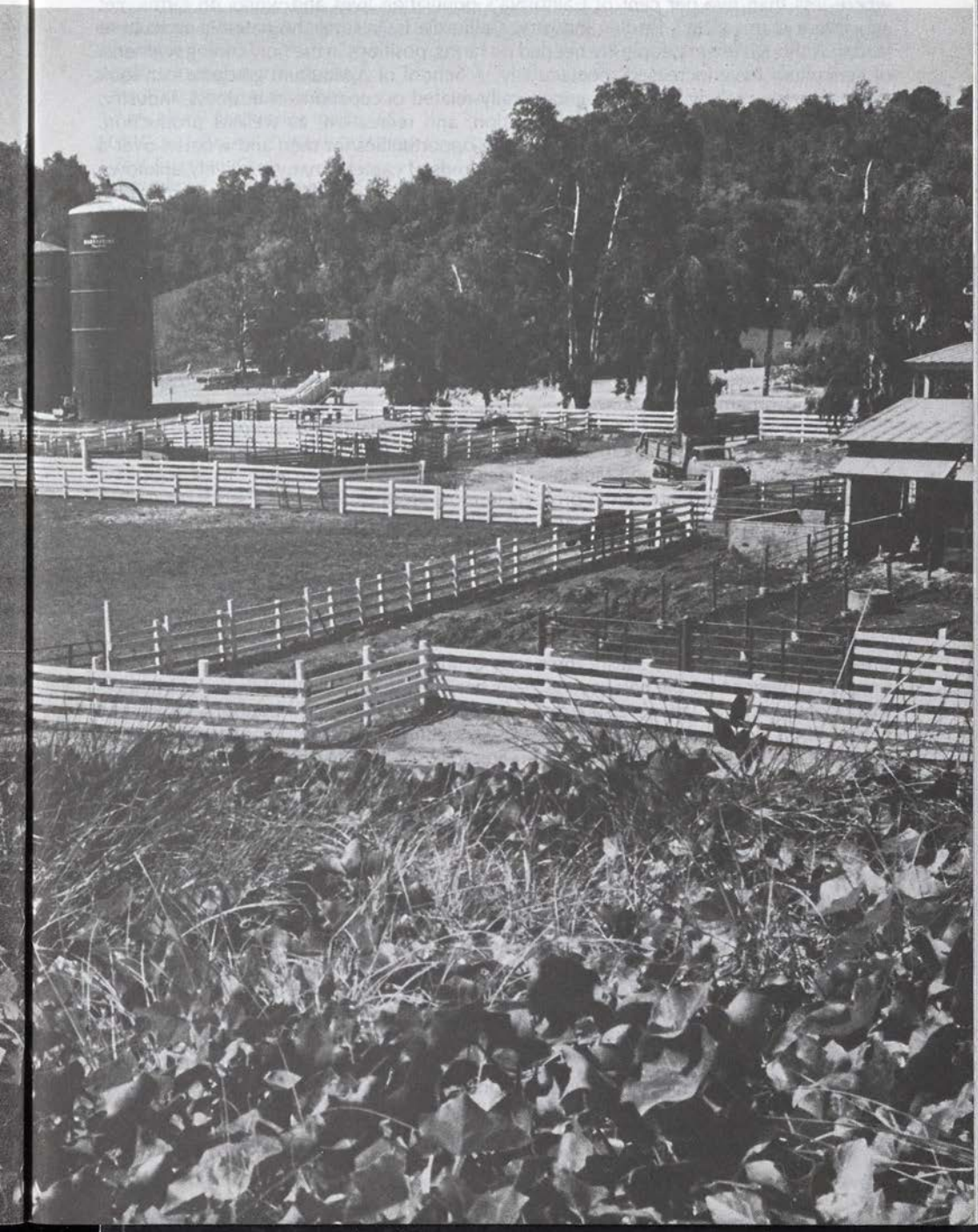
Depth: **Women in Comparative Perspective**

Select 12 units from the following:

HST 416 History of Women in the United States (4) UDS (IV-C)
EWS 390 The Ethnic Woman (4) EWS 140, 145 or permission of instructor (IV-B)
ANT 405 Women: An Anthropological View (4) ANT 102 or permission of instructor (IV-B)
PE 469 History of Women in Sport Before 1930 (2) UDS (IV-C)
PE 470 History of Women in Sport Since 1930 (2) UDS (IV-C)



SCHOOL OF AGRICULTURE



SCHOOL OF AGRICULTURE

Allen C. Christensen, *Dean*
Charles W. Asbell, *Associate Dean*
Melvin B. Belcher, *Director of International Programs in Agriculture*

Dynamic technological changes have increased management efficiency to the point where less than five per cent of California's population lives and works on farms, yet agriculture is this state's leading industry. California is, in turn, the nation's agriculture leader. Although fewer people are needed on farms, positions in the nonfarming segments of agriculture have increased spectacularly. A School of Agriculture graduate can look forward to an exciting future in agriculturally-related occupations in business, industry, specialized services, education, conservation, and recreation, as well as production. These expanding careers provide challenging opportunities for men and women over a broad spectrum of interests and abilities. Hundreds of careers, many relatively unknown a few years ago, are attracting men and women from both urban and rural communities.

Instruction in the School of Agriculture is offered in 13 majors leading to the bachelor of science degree.

Animal production flocks and herds are maintained for undergraduate instruction and graduate experimental programs.

Facilities on or near the campus make possible practical laboratories for the various majors. The university farm consists of fertile soils typical of the Southern California area with enough variation in soil type and climate to give students a broad background of experience. Over 700 acres of university-owned land are available for pastures, crops, groves, and ornamental plantings.

To assure each student of occupational competence, the university provides an opportunity to learn the fundamental skills involved in the care, maintenance, and operation of agricultural equipment and facilities. Financing is available through the Kellogg Unit Foundation for individual student projects in most areas. A supervised work program is an important part of instruction, and all departments offer employment for student assistants.

The School of Agriculture is involved in a wide variety of continuing education programs. They range from workshops in equine management to cultural food classes, from agricultural leadership conferences to food distribution seminars, pest management and citronomics. Industry and agricultural faculty work cooperatively together in planning and presenting conferences to satisfy the needs of the agribusiness industry. A particularly unique conference for the past several years has been the Agricultural Business Management conference for Japanese supermarket operators on food distribution in the United States. Short courses are provided by the agricultural education faculty in the newly emerging technical areas. Faculty stand ready to assist industry, government and others in sponsoring programs to meet the needs of the community at large.

Because of the commitments of the School of Agriculture to contributing to the total lifestyle of handicapped persons, special education concerns are incorporated into appropriate courses within the School.

As an adjunct to the academic programs, the School of Agriculture is actively engaged in international programs. One important component of these programs is the USDA's sponsorship of students from less developed countries who work for baccalaureate and master's degrees in agriculture. Another part of this international program activity is the preparation of faculty members to serve as advisors in less developed countries. Their goal is to teach the native people how to increase food production. These consultancies are supported through the government's foreign aid programs. For more information contact Melvin B. Belcher, Director of International Programs in Agriculture.

Membership in two honorary societies, Alpha Zeta and Gamma Sigma Delta, is open to all students in agriculture. Information concerning requirements for membership can

be obtained from Dr. Mack Kennington in the Animal Science Department (for Alpha Zeta) and from Dr. Kara Caldwell in the Foods and Nutrition/Home Economics Department (for Gamma Sigma Delta).

Departments and Majors

AGRICULTURAL BUSINESS MANAGEMENT
Arthur F. Parker, Chair
Agricultural Business Management major (BS); options in Economics, Food Distribution, Management, International Agriculture, major (BS). Agricultural Business Management and International Agriculture minors.

AGRICULTURAL ENGINEERING
You-Tsai Hung, Acting Chair
Agricultural Engineering major (BS)

AGRICULTURAL SCIENCE/VOCATIONAL AGRICULTURE
Flint Freeman, Chair
Agricultural Science major (BS)

ANIMAL SCIENCE
G. Duane Sharp, Chair
Animal Science major (BS) options in
- Pre-Veterinary Science
- Animal Production
- Animal Agribusiness
- Dairy Science

FOODS AND NUTRITION AND HOME ECONOMICS
Ruby Beilby, Chair
Foods and Nutrition major (BS)
Home Economics major (BS)

ORNAMENTAL HORTICULTURE
Joel W. Carter, Chair
Ornamental Horticulture major (BS)
Park Administration major (BS)

PLANT AND SOIL SCIENCE
Robert J. Tullock, Chair
Agricultural Biology major (BS);
options in
- Agricultural Biology
- Pest Management

Agronomy major (BS)
Options in
- Crop Production
- Crop Science

Fruit Industries major (BS)
Soil Science major (BS). Soil Science Minor

MASTER OF SCIENCE IN AGRICULTURE with options in:
Agricultural Science, Animal Science, and Nutrition and Food Management

Cooperative Education

The School of Agriculture commenced a cooperative education program with industry, business and government during the fall quarter, 1978. This program is designed to provide alternating periods of full-time study and full-time work. It is expected that each student on the co-op education program will spend a total of four quarters over a three-year period in the work experience. For these four quarters of experience the student wil receive 16 units of academic credit.

1. Provide the opportunity for the student to gain experience in agri-business, agricultural production and/or government. This experience should stimulate the student's interest in those areas of academic instruction that relate to the newly acquired

experience.

2. Provide the opportunity for students to evaluate alternative career opportunities.
3. Provide an opportunity for students to earn a salary which will enable them to go to school full-time during alternating quarters.
4. Provide an opportunity for prospective employers to get acquainted with co-op students.

More information may be obtained from the Office of the Dean of Agriculture and/or the University's Career Center.

The curriculum for cooperative education is listed in the following "Courses in Related Agricultural" section of the catalog.

Courses in Related Agriculture

AG 470, 471, 472, 473 Cooperative Education (2-4) (2-4) (2-4) (2-4)

On-the-job experience for all majors in the School of Agriculture. Students alternate one or more quarters of full time studies in their major with an equal number of quarters of relevant full time work for pay. Prerequisite: Consent of instructor and junior standing. (Courses must be taken in ascending sequence.)

AGRICULTURAL BIOLOGY

One of the four majors offered in the plant and soil science department is agricultural biology. For other programs in the department see agronomy, soil science and fruit industries.

Robert J. Tullock, *Chair, Plant and Soil Science Department*
Richard S. Kaae, *Coordinator, Agricultural Biology*
Rex O. Baker Lester C. Young

Agricultural biology combines the agricultural and biological sciences. Protection of food, plants, animals and man is emphasized through the management of the environment and its organisms. Agricultural biologists are involved with programs of protection that are environmentally compatible and socially responsible. These programs include the management of populations of insects, mites, nematodes, plant diseases, weeds and vertebrate pests.

Professional careers with county, state and federal departments of agriculture and allied governmental agencies in protecting and promoting agriculture and consumer and environmental protection activities are very challenging and rewarding. Challenging positions in sales, advisory services and as consultants with the various pest management and related commercial organizations and agricultural production enterprises, both domestic and international are available. Research, teaching and graduate studies are other interesting pursuits.

The marketing of agricultural products presents many opportunities for individuals with a knowledge of quality standards, and the environmental factors and organisms affecting fruits and vegetables.

Summer employment, cooperative education placement, and internships are encouraged and frequently arranged because they provide both valuable experiences and income for students.

Opportunities are expanding and are abundant for graduates because they are capable of using their knowledge for the benefit of society. In addition to the development of knowledge necessary for occupational proficiencies, sources of information are emphasized. This enables the graduate to increase professional competence and to cope with the constantly growing volume of new information. Thus graduates are prepared for immediate employment in a wide range of positions and are prepared to enhance their careers after graduation.

Certification by the California Department of Agriculture as an agricultural biologist for employment with the county departments of agriculture, as an agricultural pest control advisor, and/or as an entomologist by the Entomological Society of America is available.

Options are offered in agricultural biology and pest management. This choice of program will depend upon the student's professional career objective.

CURRICULAR OPTIONS

Agriculture Biology. This broadly based option is especially suitable for the individual who desires a variety of activities, enjoys the outdoors and likes to work with plants or animals. The professions serving agriculture and related industries by advisory and consumer and environmental protection enforcement activities are emphasized. Employment is with private business and governmental organizations.

Pest Management. This option develops a high degree of specialization for individuals oriented toward private and industrial consultancies, crop and livestock insect biology and as entomologists with governmental agencies through emphasis of total environmental problems and pest management practices.

CORE COURSES FOR MAJOR

(Required of all students)

Pest Control Equipment	AE	233	(3)
Introduction to Ag. Biology	AGB	101	(1)
Introduction to Arthropods	AGB	165	(4)
Plant Identification	AGB	224	(4)
Insect Pests Row Crops	AGB	228	(4)
Insect Pests Tree Crops	AGB	229	(4)
Principles of Pest Management	AGB	231	(3)
Ag Laws and Regulations	AGB	301	(3)
Regulatory Exclusion and Detection of Pests	AGB	322	(4)
Vertebrate Pest Management	AGB	323	(4)
Produce Market Quality	AGB	325	(3)
Career Planning in Ag Biology	AGB	372	(1)
Pest Control Practices	AGB	424	(3)
ID of Immature Arthopods	AGB	455	(3)
Senior Project	AGB	461	(2)
Senior Project	AGB	462	(2)
Undergraduate Seminar	AGB	463	(2)
Courses to complete major			(26-36)

OPTION COURSES FOR MAJOR

(Required for specific option)

PEST MANAGEMENT

Bee Science	AGB	336	(3)
Urban Pest Management	AGB	342	(4)
Insect Population Behavior	AGB	377	(3)
Field Entomology	AGB	401	(4)
Biological Control	AGB	403	(4)
Advanced Pest Management	AGB	448	(3)
Plant Growth Regulators	AGB	470	(3)
Basic Microbiology	MIC	201	(5)

AGRICULTURAL BIOLOGY

Introduction to Agricultural Business	ABM	101	(4)
or			
Agricultural Marketing	ABM	304	(3)
Fruit and Vegetable Standards	AGB	326	(4)
Field Entomology	AGB	401	(4)
or Advanced Pest Management	AGB	448	(3)

Inspection Procedures	AGB	413	(2)
Principles of Ecology	BIO	325	(4)
Mgmt Principles and Theory	OM	307	(4)
or Personnel Mgmt	ABM	402	(3)
Plant Pathology Electives			(7)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Management Accounting	ABM	324	(4)
Weeds and Weed Control	AGR	233	(4)
American Civilization	AMC	201	(4)
or			
Introduction to American Government	PLS	201	
American Civilization	AMC	202	(4)
or			
U.S. History	HST	202	
Basic Biology	BIO	115	(5)
Plant Structures and Functions	BOT	124	(5)
General Plant Pathology	BOT	323	(4)
Plant Nematology	BOT	423	(3)
College Chemistry	CHM	104	(3)
College Chemistry	CHM	105	(3)
College Chemistry Lab	CHM	141	(1)
College Chemistry Lab	CHM	142	(1)
Elements of Organic Chemistry	CHM	201	(3)
Organic Chemistry Lab	CHM	250	(1)
Freshman Composition	ENG	104	(4)
Freshman Composition	ENG	105	(4)
or			
Report Writing	COM	216	(4)
Human Relations	PSY	314	(4)
Advocacy and Argument	SP	204	(4)
Basic Soil Science	SS	231	(4)
Soil Fertility and Fertilizers	SS	233	(4)
Introduction to Statistics	STA	107	(3)
Vertebrate Zoology	ZOO	138	(5)
Arts, Literature			(12)
Social Sciences			(18)
Additional G.E.			(4)
Plant or Animal Production Electives			(7)

Course Descriptions

F, W, Sp, Su notations indicate the quarter(s) each course is normally offered.

AGB 101 Introduction to Agricultural Biology (1)

Introduction to agriculture in the United States with emphasis on California and the relationship of the agricultural biology major to agribusiness, government and the public. Sources of information will also be emphasized. 1 lecture.

AGB 165 Introduction to Arthropods (4) FWSp

Arthropods and certain relatives affecting food, plants, animals, man and his buildings. Emphasizing insects, mites, ticks, spiders, snails, and slugs; their morphological and phylogenetic relationships; habits and habitats; important characteristics affecting the well-being of mankind. 3 lectures, 1 three-hour laboratory.

AGB 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AGB 224 Plant Identification (4) F

Identification of ornamental, orchard, and crop plants by contrast of odors, leaf shapes, and arrangements; fruit and flower types, growth habits; coloration of plant parts, and environmental variations. Consideration of scientific, common, and family name; general propagation and most serious pests. 3 lectures, 1 three-hour laboratory. Prerequisite: BOT 124.

AGB 228 Insect Pests of Row, Truck and Field Crops (4) W

Recognition and distribution of the important insects and mites attacking the major field, cereal, and truck crops. Host preference and identification of damage to plant parts. Seasonal history, habits, and problems relating to pest management programs. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 165 or equivalent.

AGB 229 Insect Pests of Tree and Vine Crops (4) Sp

Recognition and distribution of the important insects and mites attacking citrus, avocados, deciduous fruit, small fruit, berries, grapes, and nut trees. Host preference and identification of damage to plant parts. Seasonal history, habits, and problems relating to pest management programs. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 165 or equivalent.

AGB 231 Principles of Pest Management (3) W

Concepts of pest management which include selective use and placement of pesticides, plant resistance, cultural and mechanical control, chemical and radiation sterilization, and the use of antimetabolites, hormones, pheromones, attractants, and repellants; selected combinations of these approaches; related laws. 3 lectures. Prerequisite: AGB 165, CHM 103 or the equivalent.

AGB 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory or a combination of both.

AGB 301 Agricultural Law and Regulations (3) FSp

Federal and California Laws and regulations affecting individuals, corporations, and agencies involved in promoting and protecting California's agriculture. Emphasis on pesticide and pest control laws and regulation. Pesticide safety included. Function and structure of pertinent federal, state and county agencies and their enforcement practices as they relate to agribusiness, including case studies. 3 lectures.

AGB 322 Regulatory Exclusion and Detection of Pests (4) W

Programs of regulatory exclusion and detection of injurious pests including: survey, detection, eradication and quarantine. Purpose and application of United States and California plant quarantine laws and regulations, including biological, economic, and administrative aspects. Identification, habits, seasonal history and hosts of potential pests and diseases. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 165, BOT 323, or consent of instructor.

AGB 323 Vertebrate Pest Management (4) Sp

Vertebrates in conflict with man; including those that interfere with the production and storage of food and fiber, transmit diseases, and damage buildings and other structures. Identification, biology, and economic importance. Management techniques. Related laws and regulations. 3 lectures. 1 three-hour laboratory.

AGB 325 Produce Market Quality (3) F

The marketing of quality fruits and vegetables from grower to consumer. Identification, cause and detection methods of quality factors resulting from insects, mites, nematodes, birds, mammals, plant diseases, and nonparasitic disorders important when marketing major fruits and vegetables. 2 lectures, 1 three-hour laboratory. Prerequisite: AGB 228, 229, BOT 323, or consent of instructor.

AGB 326 Fruit and Vegetable Standards (4) W

Quality provisions of the Agricultural Code relating to fruits, nuts, vegetables, eggs, and honey. Minimum standards for marketing, including maturity, container, marking, and size requirements. Parasitic and physiological market defects, their identification, cause, and legal tolerances. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 325.

AGB 333 Medical Entomology (3) F

Anthropod pests existing as nuisances in dwellings and other structures; door-yard pests, and pests attacking man and domestic animals. Emphasis on biology, recognition, habitat, ecology, distribution and disease transmission; techniques and materials used for control. 2 lectures, 1 three-hour laboratory. Prerequisite: AGB 165 or equivalent.

AGB 336 Bee Science (3) Sp

Care, management, and manipulation of bees. Practical application of principles for effective establishment and maintenance of apiaries. Pollination and value of bees to agriculture. Recognition and control of bee diseases. Laws and regulations pertaining to beekeeping. 2 lectures, 1 three-hour laboratory.

AGB 342 Urban Pest Management (4) W

Major pests attacking wood, plant and animal products; recognition of stages and damage; habitat, environmental requirements, seasonal history and means of control and exclusion; related laws and regulations. Prerequisite: AGB 165 or equivalent. 3 lectures, 1 three-hour laboratory.

AGB 372 Career Planning in Agricultural Biology (1) W

Critical employer-employee evaluation. Employment techniques including preparation of application forms, data sheet, and portfolio; the interview and application follow-up. 1 lecture. Prerequisite: Junior standing.

AGB 377 Insect Population Behavior (3) Sp

The study of pest populations in crop ecosystems in relation to chemical, biological, cultural, physical, and integrated control practices. Relationships among host, pest population, related biotic agents, soil, climate and management practices. 2 lectures. 1 three-hour laboratory.

AGB 400 Special Problems for Upper Division Students (1–2) FWSp

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AGB 401 Field Entomology (4) F

Collection, classification and study of insects and other arthropods from ecological zones, animals, crop plants, or other habitat situations. 2 lectures, 2 three-hour laboratories. Prerequisite: AGB 165 or a course in general entomology and consent of instructor.

AGB 403 Biological Control (4) W

Natural and induced control of insect, mite, and weed pests using agents other than toxicants; collection, production and liberation of control agents; habits and identification of major groups of parasites and predators; recent developments in pest inhibition, 3 lectures, 1 three-hour laboratory. Prerequisite: Consent of instructor.

AGB 413 Inspection Procedure (2)

Practical application of inspection techniques in the fields of vertebrate, insect, disease and weed pest management; pesticide use enforcement; nursery and seed regulation; plant quarantine and pest detection; and fruit and egg quality control. Development of: public relations programs, legal cases (collection, preparation and presentation of evidence); and program analysis. 2 lectures/week. Prerequisite: Senior standing and consent of instructor.

AGB 424 Pest Control Practices (3) Sp

Summation of entomology courses through field observations of pest levels, development of integrated control programs, and evaluations of pest management results; discussions of experimental plot designs and statistical analysis of pest distribution. 2 lectures, 1 three-hour laboratory. Prerequisite: Senior standing and consent of instructor.

AGB 441, 442 Internship in Agricultural Biology (1-3) (1-3) F

On the job experience with public and private agencies for advanced students. Professional type experience new to the student so that a valuable contribution toward career development results. Written and oral reports necessary. Approval before enrolling required. Each course can be repeated for a total of 12 units.

AGB 448 Advanced Pest Management (3) W

Current advances in the field of integrated pest management to include: an introduction to pest management research, experimental design, sampling, data treatment, and efficacy evaluation; research, development and implementation of pyrethroids, sociochemicals, metabolic inhibitors, and autocidal techniques; the role of insect vectors in plant and crop diseases; and implementation of computer technology in systems analysis of crop ecosystems.

AGB 455 Identification of Immature Arthropods (3) F

The identification of immature arthropods that are economically important. Consideration of arthropods related to insects. Emphasis on those orders of insects with complete metamorphosis, including Coleoptera, Diptera, Lepidoptera, and Hymenoptera. 1 lecture, 2 three-hour laboratories. Prerequisite: Consent of instructor.

AGB 461, 462 Senior Project (2) (2) FWSp

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

AGB 463 Undergraduate Seminar (2) F,Sp

Critical reviews of contemporary research in the field of Agricultural Biology. The student will analyze, criticize and advocate by inductive and deductive methods, that inferences in contemporary literature are based on fact or a logical, unambiguous extension of fact. Oral reports of literature and senior projects are required.

AGB 470 Plant Growth Regulators (3) W

The natural and synthetic substances used to control the growth of economic plants and their products. Emphasizes chemical characteristics, physiological plant responses, uses, and modes of application. Related laws and regulations. 2 lectures, 1 three-hour laboratory. Prerequisite: BOT 322 or CHM 321.

AGB 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

AGRICULTURAL BUSINESS MANAGEMENT

One of the two majors offered in the agricultural business management department is agricultural business management. For the other program in this department see international agriculture.

Arthur F. Parker, *Chair*

Edison I. Cabacungan, A. Reza Hoshmand, Marvin L. Klein, David E. Cole, William C. Hughes, James M. Weidman

The agricultural business management major is the application of business concepts to the agricultural industry. Options in agricultural economics, food distribution, and management are offered within the major. Because of the wide selection of course offerings, a broad range of occupational choices is available to the graduate. These include the banking and finance area, food and fiber processing, sales and marketing positions, federal, state and county government units, and agricultural communications.

The economics option includes an additional emphasis on economic analysis, statistics and mathematics. This option is recommended for the student planning advanced degree work in agricultural economics and resource development. It also prepares students to enter management positions in the agri-business arena requiring a greater depth in quantitative skills.

The food distribution option is designed for all aspects of food distribution, including transportation, packaging, product sales, advertising, public relations, food brokerage, buying, wholesaling, and retailing. Opportunities for on-the-job seasonal employment are developed to assist students in obtaining practical experience and familiarity with the current practices in California agriculture.

The management option emphasizes employment preparation and is particularly valuable to the student who has not specifically selected a vocational field but desires a broad approach in the study and skills needed in the management areas of agricultural business.

As a supplement to classroom and laboratory meetings, field trips are taken to distribution centers, production areas, and other related industries within agriculture. Frequent visits by guest speakers from leading agricultural firms further ensure that the student gains practical, current knowledge. In addition to business management, sales, and sales-promotional training, students may elect studies in specified production fields to gain valuable production techniques and experience necessary for job competency.

As a senior, the student is encouraged to take part-time employment in a related agricultural industry of interest and to work closely with management people in the development of the senior project.

CORE COURSES FOR MAJOR

(Required of all students)

Intro to Ag Business	ABM	101	(4)
Contemporary Econ Problems of Agriculture	ABM	300	(3)
Ag Marketing	ABM	304	(3)
Ag Labor Management	ABM	308	(4)
Ag Economics	ABM	311	(4)
Management Accounting	ABM	324	(4)
Ag Financial Analysis	ABM	325	(3)
Ag Data Management	ABM	375	(4)
Personnel Management	ABM	402	(3)
Senior Project	ABM	461	(2)
Senior Project	ABM	462	(2)
Senior Project	ABM	463	(2)
Ag Statistical Analysis	ABM	476	(3)

OPTION COURSES FOR MAJOR

(Required in specific options)

Agricultural Economics

Mgmt of Ag Organizations	ABM	201	(3)
Ag Enterprise Mgmt	ABM	328	(4)
Ag Enterprise Accounting	ABM	340	(4)
Ag Water Resource Utilization	ABM/IA	350	(3)
Agricultural Prices	ABM	403	(4)
Ag Market and Management Structures	ABM	412	(4)
Ag Market Research Tech	ABM	413	(3)
Trans Ag Commodities	ABM	416	(3)
World Ag Resources	IA	101	(4)

Career Directed Option Courses

Minimum of 16 units

Principles of Economics	EC	202	(4)
Program Practice	CIS	214	(4)
Legal Env of Business—Transactions	FRL	201	(4)
Legal Env Bus—Org	FRL	302	(4)
Fortran	CS	205	(4)
Money & Banking	EC	308	(4)
Int'l Trade Theory & Policy	EC	404	(4)
Intro Calculus for Business	MAT	125	(4)

(Required of all in option)

Ag Production Courses	(21)
Electives	(12)

Food Distribution Management

Complete min. of 30 units from the following:

World Ag Resources	IA	101	(4)
Mgmt of Ag Organizations	ABM	201	(3)
Ag Sales and Services Mgmt	ABM	202	(4)
Ag Supervision and Training	ABM	203	(2)
Advertising/Promotion of Ag Products	ABM	225	(3)
Ag Com Mkt	ABM	305	(3)
Distribution and Marketing of Food	ABM	306	(4)
Ag Policy	ABM	313	(4)
Ag Enterprise Mgmt	ABM	328	(4)
Ag Enterprise Accounting	ABM	340	(4)
Ag Prices	ABM	403	(4)
Land Appraisal	ABM	406	(4)
Ag Market and Management Structures	ABM	412	(4)
Ag Market Research Tech	ABM	413	(3)
Trans of Ag Commodities	ABM	416	(4)

Career Directed Option Courses:

Minimum of 40 Units

Principles of Economics	EC	202	(4)
Program Practice	CIS	214	(4)
Legal Env Bus-Trans	FRL	201	(4)
Legal Env Bus-Org	FRL	302	(4)
Harvest and Marketing	AGR	224	(4)
Meat Utilization	AS	327	(3)
Intro Mass Comm	COM	101	(4)
Fruit Science Fund	FI	101	(3)
Fund of Risk and Ins	FRL	357	(4)
Intro to Foods	FN	121	(4)
Restaurant Mgmt	HRT	405	(4)
Wines & Spirits	HRT	215	(4)
Hotel Rest Mgmt Law	FRL	310	(4)
Marketing Comm	MKT	208	(4)
Basic Hort Skills	OH	131	(4)
(Required of all in option)			
Electives			(11)

Management
(Select 35 units from the list with consent of advisor.)

World Ag Resources	IA	101	(4)
Management of Ag Organizations	ABM	201	(3)
Ag Sales & Service Mgmt	ABM	202	(4)
Ag Supervision & Training	ABM	203	(2)
Advertising/Promotion of Ag Products	ABM	225	(3)
Ag Com Mkt	ABM	305	(3)
Distribution and Marketing of Food	ABM	306	(4)
Ag Policy	ABM	313	(4)
Ag Enterprise Mgmt	ABM	328	(4)
Equine Enterprise Management	ABM	329	(3)
Intl. Mktg Ag Prod	ABM/IA	330	(3)
Ag Enterprise Accounting	ABM	340	(4)
Ag Water Res Util	ABM/IA	350	(3)
Ag Co-ops	ABM/IA	360	(3)
Econ Livestock Mktg	ABM	362	(3)
Ag Prices	ABM	403	(4)
Land Appraisal	ABM	406	(4)
Ag Market and Management Structures	ABM	412	(4)
Ag Market Research Techniques	ABM	413	(3)
Transportation of Ag Com	ABM	416	(3)
Career Emphasis Courses:			
Depth emphasis based upon advisor and department approved directed elective courses			(19)
Electives			(11)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to Amer Gov't	PLS	201	(4)
American Civilization	AMC	202	(4)
or United States History	HST	202	(4)
Life Science	BIO	110	(3)
Principles of Economics	EC	201	(4)
Freshman Composition	ENG	104	(4)
Freshman Comp	ENG	105	(4)
or Report Wrtg	COM	216	(4)
Intro Comp Syst	CIS	110	(4)
College Algebra	MAT	105	(4)
Bus & Prof Ethics	PHL	205	(4)
Adv. & Argument	SP	204	(4)
Intro to Stats	STA	107	(4)
or Intro to Stats	STA	120	(4)
Additional General Education			(32)

Additional Courses for Management Option

Principles of Economics	EC	202	(4)
Program Practice	CIS	214	(4)
Legal Env Bus-Trans	FRL	201	(4)

AGRICULTURAL BUSINESS MANAGEMENT MINOR

Introduction to Ag Business	ABM	101	(4)
Management Accounting	ABM	324	(4)
Ag Finance	ABM	325	(3)
Ag Enterprise Management	ABM	328	(4)
Select 17 units from the following:			
Ag Sales and Service Management	ABM	202	(4)
Ag Supervision and Training	ABM	203	(2)
Advertising and Promotion of Ag Products	ABM	225	(3)
Contemporary Economic Problems of Ag	ABM	300	(3)
Ag Marketing	ABM	304	(3)
Ag Comodity Marketing	ABM	305	(3)
Wholesaling and Retailing of Ag Products	ABM	306	(4)
Ag Labor management Relations	ABM	308	(4)
Ag Production Economics	ABM	311	(4)
Ag Policy	ABM	313	(4)
Equine Enterprise Management	ABM	329	(3)
International Marketing Ag Products	IA/ABM	330	(3)
Ag Enterprise Accounting	ABM	340	(4)
Ag Water Resource Utilization	IA/ABM	350	(3)
Ag Cooperatives	IA/ABM	360	(3)
Economics of Livestock Marketing	ABM	362	(3)
Introduction to Ag Data Management	ABM	375	(3)
Personnel Management	ABM	402	(3)
Agricultural Prices	ABM	403	(4)
Land Appraisal	ABM	406	(4)
Ag Marketing and Management Structures	ABM	412	(4)
Ag Marketing Research Techniques	ABM	413	(3)
Transportation of Ag Commodities	ABM	416	(3)
Statistical Analysis for Ag	ABM	476	(3)
Total units required			(32)

Course Descriptions

ABM 101 Introduction to Agricultural Business (4)

Agricultural business structures and scope of operations. Principles of operations and financing. Careers in agricultural business. 4 lectures. Must be taken during first year at Cal Poly.

ABM 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ABM 201 Management of Agricultural Organizations (3)

Applications of modern agricultural management theory to cooperatives, farms and agricultural businesses. Topics covered include communications, management theory, business structures, and farm organizations. 3 lectures.

ABM 202 Agricultural Sales and Service Management (4)

Case studies and seminar discussions concerning principles of sales, personnel selection, training, and supervision. Sales control, credit collection, theory and method of evaluation of sales and service techniques. Multimedia sales presentation. 3 lectures and 1 three-hour laboratory.

ABM 203 Agricultural Supervision and Training (2)

The principles and techniques of mechanical and technical job instruction; introductory research methods presented; job breakdown and job description as applied to agricultural business enterprises; student seminar-type discussions, demonstrations, and case study critiques. 2 lectures.

ABM 225 Advertising and Promotion of Agricultural Products (3)

Industry-sponsored agricultural advertising programs; tools of publicity, merchandising and public relations. Detailed examination of local types of advertising media, rates for short, seasonal promotions. Advertising provisions of marketing orders. Seminar-type discussions and guest speakers. 2 lectures and 1 three-hour laboratory.

ABM 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ABM 300 Contemporary Problems of Agriculture (3)

Discussions of current California, U.S. and international problems affecting agriculture. Overview of farm price squeeze, international trade, land use policy, taxation, pollution, food costs, consumerism and rural development. 3 lecture-discussions. Prerequisite: EC 201 or consent of the instructor.

ABM 304 Agricultural Marketing (3)

Economic aspects of marketing agricultural products. Problems and alternative solutions of various marketing institutions. Current trends and developments in California product marketing. 3 lectures. Prerequisite: EC 201 or permission of the instructor.

ABM 305 Agricultural Commodity Marketing and Futures Trading (3)

Principles of marketing agricultural commodities. Understanding the operation of commodity markets, developing marketing strategies and learning the mechanics of futures trading. Application for specific commodities. 3 lectures.

ABM 306 Wholesaling and Retailing of Agricultural Products (4)

Principles and practices of distributing grocery products; buying, assembling, transporting, handling, receiving and merchandising. Functions of wholesalers and intermediate handlers; chainstores, voluntary and affiliated type wholesalers, food brokers, jobbers. Operating costs for retail stores; site selection; scheduling; management of store personnel; pricing; computer application for inventory control and decision making. 3 lectures and 1 three-hour laboratory including a variety of field trips to retail and wholesale businesses.

ABM 308 Agricultural Labor Management Relations (4)

Survey of California agricultural labor. Trends and overview of history of trade unionism. Overview of agricultural and industrial trade unions. Responsibilities of unions and management. Role of unions in agriculture and agriculturally related industries. 3 lectures and one 3 hour lab.

ABM 311 Agricultural Production Economics (4)

Introduction to fundamental production economic principles applied to problems in agriculture. 4 lectures. Prerequisite: EC 201 or consent of instructor.

ABM 313 Agricultural Policy (4)

Contemporary development and economic analysis of public programs and policies affecting agriculture. Current policies and programs. Alternative policies evaluated. Seminar discussions. Policy case studies analyzed. 4 lectures. Prerequisite: EC 201 or consent.

ABM 324 Management Accounting (4)

Fundamental processes of double entry accounting. Emphasis on practical application in agricultural management. 3 lectures, 1 three-hour laboratory.

ABM 325 Agricultural Financial Analysis (3)

Techniques of financial analysis. To include capital budgeting, sources of loans for agribusiness, analysis of financial statements, credit instruments, risk and insurance for agriculture, farm credit system. 3 lectures. Prerequisite: ABM 324.

ABM 328 Agricultural Enterprise Management (4)

Criteria for decision making involving agricultural enterprises. Case studies used. Budgeting processes, credit use, and feasibility analysis. Source of economic information. Introduction to simulation of management process. Seminar discussions. 3 lectures, 1 three-hour laboratory. Prerequisite: ABM 324.

ABM 329 Equine Enterprise Management (3)

Equine enterprise analysis with emphasis on capital acquisition, leasing, land acquisition, tax problems, legal problems and labor problems. 3 lectures. Prerequisites: ABM 328, AS 325.

ABM/IA 330 International Marketing Agricultural Products (3)

Marketing of agricultural products in foreign markets. Special emphasis on selecting export markets, procedures for establishing contacts, promotion, financing, insuring, shipping, tariffs, customs, regulations and other matters related to agricultural commodities. Management practices and problems of California firms with international operations. 3 lectures.

ABM 340 Agricultural Enterprise Accounting (4)

Accounting as a management tool. Primary emphasis on accounting techniques typically used by agricultural businesses engaged in merchandising and processing. Introduces computer as an integral part of accounting processes. 3 lectures, 1 three-hour laboratory. Prerequisite: ABM 324.

ABM/IA 350 Agricultural Water Resource Utilization (3)

Current water related issues, overview of water delivery systems in the U.S. including California. Survey of water rights, administration of irrigation districts, water pollution, water conservation, efficient water management. Overview of water supplies and problems in developing nations. Field trip required. 3 lectures.

ABM/IA 360 Agricultural Cooperatives (3)

Structure, management and organization of the Agricultural Cooperative with emphasis upon current management practice. Includes comparison of cooperative with other business forms, ideals, history, and progress of the cooperative movement, problems in establishing a new cooperative; financing and membership problems. 2 lectures and 1 three-hour lab.

ABM 362 Economics of Livestock Marketing (3)

Livestock marketing practices and procedures. Study of centralized and decentralized marketing channels. Alternative marketing strategies, risk minimization, profit maximization, hedging, cyclical price trends, consumer demand. 3 lectures.

ABM 375 Introduction to Agricultural Data Management (4)

Principles and procedures involved in analysis, presentation of agricultural data for upper management. Application for agricultural business, decision making, sampling, calculation and interpretation of introductory parametric and nonparametric tests applied to market tests. Computer applications. 3 lectures, 1 three-hour laboratory. Prerequisites: STA 120 and CIS 110.

ABM 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ABM 402 Personnel Management (3)

Worker-supervisor relationships and theory; employee motivation; union and management relations; recruitment and selection; performance appraisal; communications; individual and group incentive systems; employee counseling. Case studies analyzed. Seminar discussions held, role playing emphasized, guest speakers. 3 lectures.

ABM 403 Agricultural Prices (4)

Principles and methods of price analysis, forces affecting agricultural prices, price variations, cycles and trends, price reports and forecasting, governmental agricultural price control programs and price characteristics of specific agricultural commodities. 4 lectures. Prerequisites: EC 202, ABM 304, 375.

ABM 406 Land Appraisal (4)

Principles, methods and techniques of appraising agricultural real property for loans, purchase and sale, tax assessments, condemnations, and other purposes. 3 lectures. 1 three-hour laboratory.

ABM 412 Agricultural Marketing and Management Structures (4)

A study of marketing management as applied to the specialized nature of the food and agriculture industries. Topics include marketing mix decisions, product planning, product management, pricing, promotion, distribution,

market sementation, differentiation as applied to production inputs and perishable commodities. 4 lectures.

ABM 413 Agricultural Marketing Research Techniques (3)

Collecting, tabulating and analyzing market research and sales. Topics include surveys, questionnaire development, sampling methods, experimentation, trends correlation, market factor derivation, and test marketing. Applied marketing research project required. State and federal marketing orders. 4 lectures. Prerequisite: ABM 375.

ABM 416 Transportation of Agricultural Commodities (3)

Principles of transportation of perishable agricultural products, emphasizing current trends of rail, truck and air carriers. Types of equipment available, trends and regulations including agricultural exemptions and incentives. 3 lectures.

ABM 441, 442 Internship in Agricultural Business Management (1-3) (1-3)

On-the-job training in agricultural business management providing collegiate level experience in food distribution, agricultural management. One unit credit for each 120 hours of experience and training. No more than 6 units of credit can be earned. Useful for preparation of senior project. Application to coordinator required during the quarter prior to the internship.

ABM 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Must be taken in sequence, not concurrently. Prerequisites: ABM 101, 311, 324, 325, 375 and COM 216.

ABM 463 Undergraduate Seminar (2)

New methods and developments, practices, and procedures in the field. 2 meetings. Prerequisite: Senior project completed.

ABM 476 Statistical Analysis for Agriculture (3)

Application of Statistical tools and techniques employed in agricultural economic analysis. Application of computer to selected parametric and non-parametric statistical techniques. 2 lectures. 1 three-hour laboratory. Prerequisites: ABM 375 and STA 107.

ABM 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

AGRICULTURAL ENGINEERING

You-tsai Hung, *Acting Chair*

Ramesh Kumar Charles M. Stark

Eudell Vis

Agricultural engineering is becoming increasingly important with the growth of agriculture to highly automated methods of operation. Because agriculture includes all operations and facilities utilized from the planting of seed to the packaged processed foods, many challenges await the agricultural engineer.

A student pursuing a major in agricultural engineering combines engineering sciences with basic biology to accomplish the educational objective. The student may select areas of special interest such as food engineering, soil and water, electric power and processing, power and machinery, or agricultural structures and environment.

Because of the rapid expansion in the processing of convenience foods, a student in food engineering will be concerned with the design of equipment and facilities for food processing plants.

Opportunities are abundant for the student interested in soil and water. Irrigation, drainage, flood and erosion control, and water supply require study of soils, movement of water through the soil, and design criteria for canals, ditches and dams.

The trend to large dairy, beef, swine and poultry enterprises has necessitated the automation of feed handling and processing equipment. A knowledge of electric power and electronic controls is necessary to engineer these complex systems.

The students selecting the power and machinery area, will learn how to design machines for automatic harvesting of fruits and vegetables. They will study the power testing of tractors, hydraulic systems, and the effects of noise vibrations on the equipment operator.

Students contemplating entrance into agricultural engineering should take a maximum of physics, mathematics and science in high school.

The agricultural engineering department maintains and manages a fleet of agricultural and construction equipment for instructional and farm use.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Agricultural Engineering	AE	101	(1)
Workshop Activities	AE	103	(3)
Introduction to Farm Power and Machinery	AE	110	(3)
Engineering Analysis of Agricultural Machines	AE	210	(3)
Microprocessors and Computers	AE	251	(3)
Engines and Farm Power	AE	310	(3)
Strength of Biological Materials	AE	330	(3)
Renewable Energy Uses in Agriculture	AE	331	(3)
Food Processing and Drying	AE	332	(3)
Instruments and Controls	AE	350	(3)
Human Engineering and Hydraulic Systems	AE	410	(5)
Agricultural Environments and Structures	AE	420	(3)
Irrigation Engineering	AE	440	(4)
Erosion Control & Drainage Engineering	AE	441	(4)
Senior Project	AE	461	(2)
Senior Project	AE	462	(2)
Undergraduate Seminar	AE	463	(2)
Elem Elec Engr	ECE	231	(4)
Engineering Design Graphics	MFE	121	(2)
Strength of Mtrls	ME	218	(3)
Strength of Materials	ME	219	(3)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

General Surveying	AE	232	(3)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Laboratory	CHM	151	(1)
General Chemistry Laboratory	CHM	152	(1)
Analytic Geometry and Calculus	MAT	116	(4)
Calculus of Several Variables	MAT	214	(4)
Calculus of Several Variables	MAT	215	(4)
Differential Equations	MAT	216	(4)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Thermodynamics	**ME	301	(4)
Fluid Mechanics	**ME	311	(3)
General Physics	PHY	133	(3)
General Physics Lab	PHY	153	(1)
Basic Soil Science	SS	231	(4)
Cat. I			
Freshman Composition	ENG	104	(4)
Advocacy and Argument	SP	204	(4)
Technical Writing	COM	219	(4)
Cat. II			
Analytic Geometry and Calculus	MAT	114	(3)
Analytic Geometry and Calculus	MAT	115	(3)
General Physics	PHY	131	(3)
General Physics Lab	PHY	151	(1)
General Physics	PHY	132	(3)
General Physics Lab	PHY	152	(1)
Life Science	BIO	110	(3)
Cat. III			
Any two courses with at least one course from two of the three categories			(8)
Cat. IV			
Principles of Economics	EC	201	(4)
or Introduction to Agricultural Business	ABM	101	
Introduction to Geography	GEO	102	(4)
or Principles of Sociology	SOC	201	

Cat. V			
Any Course from G.E. list			(4)
Cat. VI			
American Civilization	AMC	201	(4)
or Introduction to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Cat. VII			
Thermodynamics	ME	301	(4)
Fluid Mechanics	ME	311	(3)
Engineering Economics	IE	405	(3)

Any course selected with advisor from directed elective list	(2)
Math (restricted) *	(3)
Ag Sci Elec (restr'd) *	(12)
Natural Sci Electives (restricted) *	(3)
Directed Electives (restricted) *	(11)
UNRESTRICTED ELECTIVES	(2)

* See Advisor

** Upper division G.E. additional units selected with advisor from directed elective list.

Course Descriptions

AE 101 Introduction to Agricultural Engineering (1)

An introduction to the field of agricultural engineering, career opportunities and responsibilities. Preparatory work for future challenges, including various subfield areas of study in the agricultural engineering profession. Library research and other related activities. Preparation of engineering reports. 1 lecture.

AE 102 Fundamentals of Household Equipment and Materials (4) FWSp

Scientific principles applied to household equipment and its use. Electric wiring, motors, switches, timers, and heat sensors used in appliances. Principles of infrared, ultrasonic, and microwave energy, refrigeration, and flow of heat through utensils and materials. 3 lectures, 1 three-hour laboratory.

AE 103 Workshop Activities (3)

Basic instruction in tools, equipment, and techniques for working with wood, metal, concrete, electricity, plumbing, electric motors and pumps. 2 lectures and 1 three-hour laboratory. Prerequisite: AE 101

AE 110 Introduction to Farm Power and Machinery (3)

Principles of operation and construction of farm tractors. Performance, operation and adjustment of machines for tillage, planting, cultivating, treating and harvesting field crops. 2 lectures and 1 three-hour laboratory. Prerequisite: MAT 105 or equivalent.

AE 121 Construction Fundamentals (2) FWSp

Safety in construction techniques, material strength tests, and structural planning. Carpentry and masonry tools, hardware and materials as applied to construction of various structures. Hand and power equipment, 1 lecture, 1 three-hour laboratory.

AE 122 Utility Systems (2) FWSp

Electrical power and lighting systems. Electrical principles, codes, construction techniques and wiring practices. Fundamentals of water pressure systems. Methods of installation. 1 lecture, 1 three-hour laboratory.

AE 123 Welding (2) FWSp

Fundamentals of arc and acetylene welding. Flat, horizontal, vertical, and overhead positions. Cutting, brazing, hard-facing. Practical arts and skills of metal fabrication. 1 lecture, 1 three-hour laboratory.

AE 124 Landscape Construction (3)

Theory and application of hardscape materials used in the landscaping trade. Techniques and safety using common tools in the construction of decks, enclosed wooden structures, and concrete surfaces. Uses of lighting, masonry, irrigation, plumbing equipment, and plastics. 2 lectures and 1 three-hour laboratory.

AE 131 Surveying Fundamentals (2) FW

Measurement of distances, elevations, angles, and directions. Care and use of surveying equipment. Contours, maps, field notes, calculation methods. 1 lecture, 1 three-hour laboratory. Prerequisite: MAT 101 or 102.

AE 132 Surveying Applications (2) FWSp

Plane table mapping, earth yardage for land forming, cuts and fills by planimeter, curve surveys topographic maps by transitstadia. Desk calculator methods. 1 lecture, 1 three-hour laboratory. Prerequisite: AE 131.

AE 200 Special Problems for Lower Division Students (1–2) FWSp

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AE 210 Engineering Analysis of Agricultural Machines (3) Sp

A functional and force analysis of soil working tools, planting equipment, pest control equipment, and harvesting equipment. The application of statics and dynamics to machine units. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 215.

AE 215 Tractor Power and Machinery (4) Sp

A study of the operating principles of internal combustion engines including detailed studies of valves, ignition, carburetion, and power measurement. Operating principles and adjustments of field machinery such as plows, harrows, planters, grain harvesters, and hay harvesting equipment. 3 lectures, 1 three-hour laboratory. Prerequisite: AE 241 or equivalent.

AE 231 Materials and Creative Construction (2)

Creative use of construction, flower and plant materials to develop an art form to match the chosen theme of a floral festival. Use of various tools and equipment to achieve the desired aesthetic and functional perceptions. 1 lecture, 45 hours of laboratory work arranged by the instructor.

AE 232 General Surveying (3)

Measurement of distances, elevations, angles, and directions. Contours, maps, plane table mapping, earth yardage for land forming, cuts and fills, road curves, and aerial photogrammetry. Care of surveying equipment, note taking and calculations. 2 lectures and 1 three-hour laboratory. Prerequisite: MAT 104.

AE 233 Pest Control Equipment (3) WSp

Principles of machines and power units as applied to various types of spraying, dusting, and fumigation equipment used in structural and agricultural industries. Structural pest control equipment. Structural repair techniques. 2 lectures, 1 three-hour laboratory. Prerequisite: MAT 101 or 102.

AE 240 Irrigation (4) FW

Principles and practices of irrigation. Irrigation design engineering. Pumps, wells, water conveyance and measurement. Surface, sub-surface, drip and sprinkler irrigation. Science of plant-soil-water relationships. Water requirements of crops. Leaching and drainage problems. 3 lectures. 1 three-hour laboratory. Prerequisite: AE 131, SS 231, MAT 101 or 102.

AE 241 Tractors (2) FWSp

Basic principles of engines and power transmission. Safe field and shop practice in operation, service, adjustment, and minor repair of wheeled and tracklayer tractors. Gasoline, LPG, and diesel engines. Includes bulldozer, backhoes, skiploaders, etc. 1 lecture, 1 three-hour laboratory.

AE 251 Microprocessors and Computers (3)

Introduction to microprocessor and computer use, hardware and software. Use of flow charting and programming to solve problems. 2 lectures and 1 three-hour laboratory.

AE 299 Special Topics for Lower Division Students (1-4) FWSp

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

AE 301 Facilities Maintenance Technology (4) Sp

Application of basic science to the operation and maintenance of electrical and mechanical equipment; refrigeration, heating, cooking, dish-washing, cleaning, etc. Fire protection and safety are also included. Three lectures and one three-hour laboratory. Prerequisite: MAT 101 or equivalent.

AE 310 Engines and Farm Power (3) W

Energy conversion and thermodynamics of engines. Power testing of tractors and agricultural power units. 2 lectures and 1 three-hour laboratory. Prerequisite: ME 301.

AE 321 Automatic Irrigation Systems (4) WSp

Engineering design, sprinkler and drip equipment, clock control mechanisms, soil moisture sensing devices, pressure loss, trouble-shooting, electro-hydraulic systems. Application to turf installations. 3 lectures. 1 three-hour laboratory. Prerequisite: AE 122, SS 231, MAT 101 or 102.

AE 330 Strength of Biological Materials (3) F

Resistance to mashing and resulting damage to such products as fruits, vegetables, grain, and eggs. Absorption of loads applied to these biological materials and how the loads are transmitted to container walls and floors. 3 lectures. Prerequisite: ME 219.

AE 331 Renewable Energy and Uses in Agriculture (3)

Fundamentals of renewable energy sources: natural, chemical, physical, and biological processes. Energy conversion characteristics of solar collectors, fuel cells, biomass processes, etc. Systems design and analysis for efficient energy utilization in agriculture industries. 2 lectures and 1 three-hour laboratory.

AE 332 Processing and Drying of Foods and Feed (3)

A study of air-humidity relationships, heat transfer and moisture movement and removal from fruits, vegetables, hay, grain and other food products. Principles of freeze drying, hydrocooling, vacuum drying are applied to

processing agricultural products. 2 lectures and 1 three-hour laboratory. Prerequisites: MAT 216, ME 301.

AE 340 Drip Irrigation (3) Sp

Design, operation and maintenance of drip irrigation systems, including determination of plant water requirements, emitter selection and uniformity of water distribution. Lateral, manifold, and mainline design, filtration, fertilization and automation are included. 2 lectures, 1 three-hour laboratory. Prerequisite: AE 240 or AE 321.

AE 350 Instruments and Controls (3)

Fundamentals of instruments and their operation characteristics with respect to damping, range, and accuracy. Electric, electronic, and fluidic controls for sensing and controlling devices. Two lectures and one three-hour laboratory. Prerequisites: MAT 216, PHY 133.

AE 400 Special Problems for Upper Division Students (1-2) FWSp

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AE 410 Human Engineering/Hydraulic Systems (5)

Effect of noise, vibrations, temperature, humidity, etc. on humans and their ability to operate equipment. Also dimensions of body movements with respect to design of machines. Design of hydraulic and pneumatic systems for powering, sensing and controlling machine functions. 4 lectures and 1 three-hour laboratory. Prerequisite: MAT 216.

AE 420 Agricultural Environments and Structures (3)

Design of building walls, floor, and members to withstand forces of wind, snow, and product storage. Optimum building environments are designed for animals, greenhouse plants, and fruit and vegetable storage. 2 lectures and 1 three-hour laboratory. Prerequisites: AE 332, ME 219.

AE 421 Park Equipment Management (4) F

Principles of management and operation of park and horticultural equipment fleets. Economic considerations of leases, ownership, and rental. Principles of power determination and mechanism design evaluation. Mechanical, electrical, pneumatic, and hydraulic equipment investigations. 3 lectures, 1 three-hour laboratory. Prerequisite: Senior standing.

AE 440 Irrigation Engineering (4) F

Operating characteristics of different systems of irrigation; sprinkler, drip, flooding, etc. Calculation of water requirements for crops and soils. Engineering design of water application rates, soil absorption rates and automatic equipment. 3 lectures. 1 three-hour laboratory. Prerequisite: ME 311.

AE 441 Erosion Control and Drainage Engineering (4) W

Engineering the methods of reducing the erosive velocity of water flow over land surfaces. Determining the optimum size of pipes and ditches to remove and convey water from the soil. 3 lectures. 1 three-hour laboratory. Prerequisite: ME 311.

AE 461, 462 Senior Project (2) (2) FW

Students will select an engineering problem in their area of interest. Project will be completed under appropriate faculty supervision and will culminate in a written report.

AE 463 Undergraduate Seminar (2) Sp

Student presentation and discussion of recent research and development in Agricultural Engineering. 2 lectures.

AE 499 Special Topics for Upper Division Students (1-4) FWSp

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

AGRICULTURAL SCIENCE/VOCATIONAL AGRICULTURE

Flint Freeman, *Chair*

Richard Hylton

The primary function of the vocational agricultural education program is the preparation of teachers of vocational agriculture for the public secondary schools of California. Specialized preprofessional and professional courses are offered for undergraduate and graduate (fifth year) students. Technological, scientific, and broad general education course work for agriculture teaching candidates is offered throughout the School of Agriculture and other schools including the Teacher Preparation Center.

Students with an interest in becoming agriculture teachers are advised to enroll in the agricultural science major and obtain a B.S. degree, or they may complete a B.S. degree in one of the other approved majors in the School of Agriculture. Agricultural science majors and all students who wish teacher certification are required to show competency in four areas of agriculture. This can be accomplished by completing units required for the B.S. in agricultural science as listed below or by receiving a passing grade on the National Teacher Examinations test: (1) agricultural business management or farm management, 8 units, (2) agricultural engineering or agricultural mechanics, 18 units, (3) animal science, 18 units, and (4) plant/soil science and ornamental horticulture, 26 units.

In addition to course work in the above enumerated four areas of agriculture, students who plan to teach vocational agriculture must have two years of practical experience in agriculture and must complete an Agricultural Specialist credential. The Agricultural Specialist credential requires a minimum of 45 additional units beyond the B.S. degree. Some of the graduate work may be applied towards a Master of Science in Agriculture, Agricultural Science Concentration.

Enrollment in a Single Subjects credential program is required in order to qualify for student teaching. Candidates for the Single Subjects teaching credential who are not agricultural science majors are advised to wisely use the electives available in their major in order to complete required teaching credential courses which are not normally specified in their undergraduate major. Because of the wide range of variables involved, all candidates for teaching certification are urged to consult the Agricultural Science/Vocational Agriculture Department as early as possible in their college careers.

For students wishing to obtain a Master of Science in Agriculture, such a degree has been approved with options in both agricultural science and animal science.

CORE COURSES FOR MAJOR

(Required of all majors in agricultural science. Students interested in teaching should see the Teacher Preparation section for additional secondary education requirements.)

Management Accounting	ABM	324	(4)
Agricultural Enterprise Management	ABM	328	(4)
Construction Fundamentals	AE	121	(2)
Utility Systems	AE	122	(2)
Welding	AE	123	(2)
Surveying Fundamentals	AE	131	(2)
Farm Tractor Power	AE	215	(4)
Irrigation	AE	240	(4)
Tractors	AE	241	(2)
Dev of Competitive Ag Activities	AG	250	(2)
Intro to Vocational Agriculture Programs	AG	300	(3)
Vo Ag Facilities Management	AG	420	(3)
Senior Project	AG	461	(2)
Senior Project	AG	462	(2)
Undergraduate Seminar	AG	463	(2)
Introduction to Arthropods	AGB	165	(4)
Agricultural Law and Regulations	AGB	301	(3)
Introduction to Plant Science	AGR	111	(3)
Vegetable Crop Production	AGR	226	(4)
Irrigated Pastures	AGR	333	(4)
Feeds and Feeding	AS	101	(4)
Introductory Swine Production	AS	122	(4)
or			
Poultry Principles	PS	131	
Introductory Sheep Production	AS	123	(4)
Introductory Horse Production	AS	125	(4)
Introductory Beef Production	AS	131	(4)
Meat Science	AS	227	(3)
or			
Meat Utilization	AS	327	
Liestock Judging	AS	241	(2)
Pomology	FI	203	(4)
Basic Ornamental Horticulture	OH	131	(4)
Basic Floral Design	OH	223	(3)
Native Plant Materials	OH	336	(3)
Basic Soil Science	SS	231	(4)

SUPPORT COURSES

Freshman Composition	ENG	104	(4)
Intro to Ag Business	ABM	101	(4)
Intro to Cultural Anthropology	ANT	102	(4)
Basic Biology	BIO	115	(5)
Plant Structures and Functions	BOT	124	(5)
College Chemistry	CHM	104	(3)
College Chemistry	CHM	141	(1)
History of Civilization	HST	101	(4)
U.S. History	HST	202	(4)
or			
American Civilization	AMC	202	
College Algebra	MAT	105	(4)
Logics and Semantics	PHL	202	(4)
School and Community Health	PE	306	(2)
Intro to American Government	PLS	201	(4)
or			
American Civilization	AMC	201	
General Psychology	PSY	201	(4)
Cognitive Processes	PSY	334	(4)
Educational Psychology	PSY	340	(4)
Theories of Learning	PSY	402	(4)
Public Speaking	SP	100	(4)
Elementary Spanish	SPN	101	(4)

Arts (Choose from Cat. IIIA) ..... (4)
Electives ..... (20–21)

SINGLE SUBJECTS TEACHING CREDENTIAL

In addition to a B.S. in Agriculture, students preparing to student teach must complete requirements for the single subjects credential. The required courses include:

Procedures in Agricultural Education	AG	440	(4)
Teaching Foundation	TEP	391	(3)
Philosophical Foundation in Education	TEP	392	(3)
Psychological Foundations in Education	TEP	393	(3)
Vocational Skill Reading Instruction	TEP	414	(4)
Student Teaching in Single Subjects, Block 1	TEP	444	(6)
Student Teaching in Single Subjects, Block 2	TEP	445	(12)
Field Practices and Supervision	AG	450	(3)
Exceptional Child	TEP	454	(3)
School and Community Health	PE	306	(2)

A total of 45 graduate credit units are required for the Single Subject credential*.

AGRICULTURAL SPECIALIST CREDENTIAL

In addition to a B.S. in Agriculture, students preparing to teach vocational agriculture must complete the requirements for the single subjects credential and the requirements for the agricultural specialist credential. The courses include:

Intro to Vocational Agriculture Programs	AG	300	(3)
Special Problems	AG	400	(2-4)
Vocational Agricultural Facilities Management	AG	420	(3)
Young and Adult Programs and Youth Leadership	AG	505	(3)
Program Planning and Development	AG	530	(3)
Electives			(1-8)

Students are also required to have a concentration of 27 units, including 9 upper division, in one area of agriculture. This is generally completed as an undergraduate. A minimum of 2 years of verified work experience in agriculture is also required.

A total of 45 graduate credit units are required for the Agricultural Specialist credential*.

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* Students may complete the requirements for both the Single Subject and the Agricultural Specialist credentials concurrently. A limited number of courses may be taken at the undergraduate level. Students should consult with the Agricultural Science/Vocational Agriculture Department prior to enrolling in any courses to be used for credentialling purposes.

Courses in Related Agriculture

AG 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AG 250 Development of Competitive Agricultural Activities (2)

The philosophy and development of competitive activities for students of agriculture. Selection of contest officials, development of contest patterns, scoring of placing cards, and publications of results. Use of the California Curricular Code. Practical application of this class will occur with the operation of Agriculture Field Day. 2 lectures.

AG 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

AG 300 Introduction to Vocational Agriculture Programs (3)

Overview of vocational agriculture programs including goals and purposes. Qualifications essential to success in vocational agriculture. Programs of studies to meet requirements for instruction in vocational agriculture. 3 lecture discussions.

AG 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AG 420 Vocational Agricultural Facilities Management (3)

Development, operation and management of vocational agriculture facilities. Classrooms, laboratories, and school farms will be analyzed in relation to vocational agriculture. Emphasis on the operation and management of agricultural mechanics laboratories and educational greenhouses. 2 lectures, 1 activity.

AG 440 Procedures in Agricultural Education (4)

Approaches to the learning process and development of daily and unit plans as well as the utilization of resources. Class demonstration in teaching procedures with emphasis being given to J.I.T., micro-teaching, and the development of pedagogical skills including development analysis and evaluation. 2 lectures, 2 activity periods.

AG 441, 442 Internship in Agricultural Education (1–6) (1–6)

On-the-job experience in agriculture with public and private agencies for advanced students. Professional-type experience new to the student so that a valuable contribution toward career development results. One unit credit for each 100 hours of experience. Written reports necessary. Approval required before enrolling. Prerequisite: Junior standing.

AG 450 Field Practices and Supervision (3)

Organization and implementation of an instructional program in vocational agriculture. Field application of F.F.A., supervised practice, and classroom instruction. 1 lecture, 2 activity periods.

AG 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

AG 463 Undergraduate Seminar (2)

A study of current developments in agricultural education and a discussion of periodical literature. 2 lectures.

AG 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

Graduate courses are listed in the graduate section of this catalog.

AGRONOMY

One of the four majors offered in the plant and soil science department is agronomy. For other programs in this department see agricultural biology, soil science and fruit industries.

Robert J. Tullock, *Chair, Plant and Soil Science Department*

Gerald L. Croissant, *Coordinator, Agronomy*

Charles W. Asbell Daniel G. Hostetler

The agronomy student has two options. The Crop Production option is designed to give students a practical and scientific background in the production of food, fiber, and feed crops. Courses emphasize current practices employed by commercial agriculture in California and other major agricultural areas.

The Crop Science option offers students an opportunity to receive training in applied Agronomy while at the same time preparing specifically for graduate studies.

Students in both options are taught agronomic fundamentals that will enable them to understand and adapt to technological and scientific developments as they occur in the future. These fundamentals include principles of environmental management so important to insuring a continuous supply of agricultural products.

Agronomy students at Cal Poly have a unique opportunity to obtain actual experience in growing crop plants. The university farm regularly hires students to help maintain over 400 acres of vegetable crops, field crops, forages, cereals and pastures. Enterprising students are allowed to conduct individual or group crop projects involving small plots or several acres of land. These projects provide valuable training in all phases of crop farm operations, and at the same time allow the students to share in the profits.

Employment possibilities are numerous. In addition to commercial crop production, students are prepared to work in the agricultural chemical industry, the seed industry, crop processing and marketing, and county, state, and federal agencies. Traditionally a man's field, women are now finding agronomy to be not only a fascinating study but a promising vocation.

CORE COURSES FOR MAJOR

(Required of all students)

Cereal Crops	AGR	122	(4)
Field Crops	AGR	221	(4)
Harvesting & Marketing of Vegetables	AGR	224	(4)
Vegetable Crop Production	AGR	226	(4)
Weeds and Weed Control	AGR	233	(4)
Crop Technology	AGR	322	(4)
Irrigated Pastures	AGR	333	(4)
Plant Breeding	AGR	404	(4)
Crop Diseases	AGR	421	(4)
Basic Soil Science	SS	231	(4)
Soil Fertility and Fertilizers	SS	233	(4)

OPTION COURSES FOR MAJOR

(Required for specific option)

Crop Production Option

Seed Production	AGR	331	(4)
Crop Management Operations	AGR	437	(3)
Soil Management	SS	232	(4)
Soil and Plant Analysis	SS	339	(3)
Tractor Power and Machinery	AE	215	(4)
Irrigation	AE	240	(4)
ABM 304, 308, 325, 402 (Choose one listed)			(3)
AE 121, 122, 123 (Choose one listed)			(2)
Animal Agricultural Science	AS	111	(4)

Crop Science Option

Introduction to Statistics	STA	107	(3)
Biometrics	BIO	411	(3)
Or			
Statistical Analysis for Agriculture	ABM	476	
Plant Physiology	BOT	322	(5)
Or			
Biochemistry	CHM	321	
Growth Regulators	AGB	470	(3)
College Physics	PHY	121,122	(3,3)
College Physics Lab	PHY	141, 142	(1,1)
College Chemistry	CHM	106	(3)
College Chemistry Laboratory	CHM	143	(1)
Quantitative Analysis	CHM	221	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Management Accounting	ABM	324*	(4)
Surveying Fundamentals	AE	131	(2)
Tractors	AE	241	(2)
Introduction to Arthropods	AGB	165	(4)
Insect Pests Row Crops	AGB	228	(3)
Principles of Pest Management	AGB	231	(4)
Introduction to Plant Science	AGR	111	(4)
American Civilization	AMC	201*	(4)
Or			
Introduction to American Government	PLS	201	
American Civilization	AMC	202*	(4)
Or			
U.S. History	HST	202	
Basic Biology	BIO	115*	(5)
Genetics	BIO	303*	(4)
Plant Structures and Functions	BOT	124*	(5)
General Plant Pathology	BOT	323	(4)
College Chemistry	CHM	104*	(3)
College Chemistry	CHM	105*	(3)
College Chemistry Lab	CHM	141*	(1)
College Chemistry Lab	CHM	142*	(1)
Elements of Organic Chemistry	CHM	201*	(3)
Organic Chemistry Lab	CHM	250*	(1)
Freshman Composition	ENG	104	(4)
College Algebra	MAT	105	(4)
or			
Trigonometry	MAT	106	(4)
Senior Project	AGR	461	(2)
Senior Project	AGR	462	(2)
Undergraduate Seminar	AGR	463	(2)

Communication in the English Language	(8)
Humanities	(12)
Social Sciences	(8)
Integrated Being	(4)
Additional amounts to complete degree	(15–16)

* May be used for General Education Requirements

Course Descriptions

F, W, Sp and Su notations indicate the quarter(s) each course is normally offered.

AGR 111 Introduction to Plant Science (4) FWSp

Introduction to the fundamental characteristics of economic plants and their interaction with the environment. Examines the contemporary influences of science, technology, and society on productivity. 4 lectures.

AGR 122 Cereal Crops (4) W

Production and management of the major California cereal crop varieties. Characteristics of these varieties in relation to applicable cultural practices, harvesting, cost of production, grain grading and processing, marketing, disease and pest control. 3 lectures, 1 three-hour laboratory.

AGR 123 Forage Crops (4) FW

Production, harvesting, and utilization of principal California forage crops, identification and utilization of range plants studied in the field. 3 lectures, 1 three-hour laboratory.

AGR 200 Special Problems for Lower Division Students (1–2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AGR 221 Field Crops (4) F

Growing of California field crops other than cereals, such as cotton, field beans, sugar beets, and potatoes. Characteristics of the major varieties in relation to the best cultural harvesting, marketing, disease, and pest control practices. 3 lectures, 1 three-hour laboratory.

AGR 224 Harvesting and Marketing of Vegetables (4) FW

Harvesting methods and procedures; current handling and packaging techniques; grades and grading, mimimum standards, containers, storage; requirements of crops for processing, 3 lectures, 1 three-hour laboratory.

AGR 226 Vegetable Crop Production (4) FSpSu

Cultural practices, varieties, economics of production of major warm and cool season vegetables. Application of production techniques on college-operated acreage. 3 lectures, 1 three-hour laboratory.

AGR 233 Weeds and Weed Control (4) SpSu

Recognition and control of weeds injurious to California crop and range lands. Classification of weeds and their seed. Dissemination; cultural, chemical, and biological control practices; laws regarding weeds. 3 lectures, 1 three-hour laboratory.

AGR 299 Special Topics for Lower Division Students (1–4) FWSp

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

AGR 322 Crop Technology (4) W

Grades and qualities of California field crops as they affect market values. Determination of factors affecting optimum harvesting and storage. Technology of processing. 3 lectures. 1 three-hour laboratory. Prerequisite: AGR 122, 221, 224.

AGR 331 Seed Production (4) F

California field, vegetable and flower seed production. Location methods of growing, harvesting, storing. Economic outlook for principal kinds. Certified seed production. Seed laws. 3 lectures, 1 three-hour laboratory. Prerequisite: AGR 122, 221, 226, 233.

AGR 333 Irrigated Pastures (4) FSp

Culture, management, fertilization, composition, and costs of California irrigated pastures. Identification, adaptation, and utilization of major irrigated pasture varieties. 3 lectures, 1 three-hour laboratory.

AGR 336 Range Management (4) Sp

Soil and plant characteristics of rangelands. Management practices used to maintain range resources and increase production of forage and livestock. Identification of important range plants. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 221 or 231.

AGR 341 Farm Cultural Practices (3) F

Practical application of primary and secondary crop production cultural practices with a relationship to field conditions. Sequence and necessity of operations from soil preparation through harvesting. Analysis of equipment efficiency to crop culture. 1 one-hour lecture, 2 three-hour laboratories. Prerequisite: AE 215 or AE 241 and any crop production course, or by permission of the instructor.

AGR 400 Special Problems for Upper Division Students (1–2) FWSpSu

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AGR 404 Plant Breeding (4) Sp

Principles and techniques of improving crop plants. Field plot design and statistics applied to experimentation in crop improvement. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 303.

AGR 421 Crop Diseases (4) FW

Methods of recognizing and controlling diseases of commercial vegetable and field crops. Chemical and cultural control methods that are presently being utilized in California. 3 lectures, 1 three-hour laboratory. Prerequisite: BOT 323.

AGR 437 Crop Management Operations (3) W

Management decisions affecting the efficient operation of commercial vegetable, field, and orchard acreages. Cost determinations, leasing, labor relations, credit, machinery management, calendar of operations. 2 lectures, 1 three-hour laboratory. Prerequisite: senior standing.

AGR 441, 442 Internship in Agronomy (1–4) (1–4) FWSpSu

On-the-job experience with public and private agencies for advanced students. Professional type experience new to the student so that a valuable contribution toward career development results. One unit credit for each 100 hours of experience. Written reports necessary. Approval required before enrolling. Prerequisite: Junior standing.

AGR 461, 462 Senior Project (2) (2) FWSpSu

Selection and completion of a project under facility supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

AGR 463 Undergraduate Seminar (2) FSp

Critical review of contemporary research in the field of Agronomy. The student will analyze, criticize and advocate by inductive and deductive methods that inferences in contemporary literature are based on fact or logical, unambiguous extension of fact. Oral reports of contemporary literature and senior projects are required.

AGR 499 Special Topics for Upper Division Students (1–4) FWSp

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

CAT

ANIMAL SCIENCE

G. Duane Sharp, *Chair*

Keith Adams
Melinda J. Burrill
Allen C. Christensen
Edward A. Cogger
Dennis D. Crenwelge
Norman K. Dunn
Edward S. Fonda
Gerald E. Hackett, Jr.
Eugene K. Keating
Mack H. Kennington
Cedric Y. Matsushima
Laurie Lee Moise
Edward A. Nelson
C. Robert Nett
John E. Trei
Adolph A. Wysocki

A four-year curriculum leading to a Bachelor of Science degree in Animal Science with options in preveterinary science, animal production, dairy science, and animal agri-business is offered by the department.

Courses offered by the department are designed to fulfill career needs for men and women in the science and business phases of the animal industry.

Specialized laboratories are provided for meat, wool, poultry, eggs, feed processing and animal production. The department maintains 330 acres of range land and 100 acres of irrigated pasture. Livestock includes a purebred breeding herd of Aberdeen-Angus and Polled Herefords, and commercial feeder cattle; the Kellogg Arabian horses; flocks of purebred Rambouillet, Suffolk, St. Croix, Finnsheep and Hampshire sheep; a herd representing commercial breeds of swine; a herd of producing dairy goats; and flocks of laying hens, fryers and turkeys.

A Master of Science degree in Agriculture with an option in animal science is offered. Specializations available within the degree are animal nutrition, animal breeding, meat science, and animal physiology.

Location of the college provides rich opportunities for students to obtain specialized and practical educational experience in production, management, feeding, marketing and processing. Cooperation of prominent local breeders, feeders, producers, marketing organizations and related animal industries offers additional opportunity for field study.

Facilities for student-owned and operated livestock projects are made available by the Cal Poly Foundation. The pre-veterinary science option meets requirements for admission to schools of veterinary medicine, related medical technical fields, and for graduate study in animal nutrition, meat science, animal breeding and animal physiology.

The animal production option stresses preparation for management of livestock, horse and poultry enterprises. The option is of particular value to the student planning to teach agriculture at the secondary level or to serve in underdeveloped nations.

The animal agri-business option stresses preparation for management and marketing in animal agri-business of non-ranch types. Particular emphasis is given to agri-business needing animal specialists as a part of their management or marketing team.

The dairy science option is designed to prepare students for qualification as professional managers and related agri-business personnel for the dairy industry. Special emphasis is placed on production, manufacture and marketing schemes related to intensive-type dairy systems.

For the student interested in meat science and processing, specialized courses are available. A student may develop a program emphasizing meat science by consulting with the appropriate departmental advisor.

Non-majors may elect to minor in Animal Science by completing a minimum of 31 units, 9 of which must be upper division.

CORE COURSES FOR MAJOR

(Required of all students)

Feeds & Feeding	AS	101	(4)
Animal Agricultural Science	AS	111	(4)
Introduction to Swine Production	AS	122	(4)
Introduction to Sheep Production	AS	123	(4)
Introduction to Beef Production	AS	131	(4)
Meat Science	AS	227	(3)
or			
Meat Utilization	AS	327	
Advanced Livestock Feeding	AS	303	(2)
Ration Formulation	AS	304	(2)
Animal Nutrition	AS	402	(4)
or			
Ruminant Nutrition	AS	403	(3)
Animal Breeding	AS	404	(4)
Senior Project	AS	461	(2)
Senior Project	AS	462	(2)
Undergraduate Seminar	AS	463	(2)
Poultry Principles	PS	131	(4)
Physiology of Domestic Animals	VS	205	(4)
Animal Diseases	VS	301	(3)

OPTION COURSES FOR MAJOR

(Required in specific options)

PRE-VETERINARY SCIENCE/GRADUATE SCHOOL

College Chemistry	CHM	106*	(3)
College Chemistry Lab	CHM	143*	(1)
or			
General Chemistry	CHM	113	(3)
General Chemistry Lab	CHM	153	(1)
College Physics	PHY	121*	(3)
College Physics	PHY	122*	(3)
College Physics	PHY	123*	(3)
Vertebrate Zoology	ZOO	138*	(5)
Collect Physics Lab	PHY	141	(1)
College Physics Lab	PHY	142	(1)
College Physics Lab	PHY	143	(1)
Embryology	ZOO	414*	(5)
Introd. to Statistics	STA	107*	(4)
Mammalian Endocrinology	AS	412	(4)

Animal Parasitology	VS	302	(4)

Support and Directed Courses

(Pre-Veterinary Science/Graduate School

Management Accounting	ABM	324	(4)
Organic Chemistry	CHM	211*	(3)
Organic Chemistry Lab	CHM	251*	(1)
Organic Chemistry	CHM	212*	(3)
Organic Chemistry	CHM	213*	(3)
Trigonometry	MAT	106	(4)
Basic Microbiology	MIC	201	(5)
Basic Soil Science	SS	231	(4)

* Required Pre-Veterinary Medicine Courses—U.C. Davis.

ANIMAL PRODUCTION

Tractors	AE	241	(2)
Forage Crops	AGR	123	(4)
or			
Cereal Crops	AGR	122	
Irrigated Pastures	AGR	333	(4)
or			
Range Management	AGR	336	
Dairy Science	AS	150	(4)
Prin of Market Animal Eval	AS	240	(4)
Approved Animal Science Electives			(25)

ANIMAL AGRI-BUSINESS

Select 30 units

Agricultural Policy	ABM	313	(4)
Adv & Prom of Agr Prod	ABM	225	(3)
Agricultural Mkting	ABM	304	(3)
Agr Labor Mgt Rel	ABM	308	(4)
Agr Prod Econ	ABM	311	(4)
Agr Fin Analysis	ABM	325	(3)
Introd to Ag Data Mgt	ABM	375	(3)
Personnel Mgt	ABM	402	(3)
Agr Prices	ABM	403	(4)
Land Appraisal	ABM	406	(4)
Intro to Computing	CIS	110	(4)
Econ of Livestock Mktg	ABM	362	(3)
Legal Env of Bus	FRL	201	(4)
Legal Env of Bus Organ	FRL	302	(4)
Animal Science Electives			(12)

DAIRY SCIENCE

Tractors	AE	241	(2)
Forage Crops	AGR	123	(4)
or			
Cereal Crops	AGR	122	
Irrigated Pastures	AGR	333	(4)
or			
Range Management	AGR	336	
Dairy Science	AS	150	(4)
Applied Dairy Nutrition	AS	301	(2)
Artificial Insemination	AS	305	(3)
Reprod Phys Food Animals	AS	414	(3)
Phys of Lactation	AS	413	(3)
Dairy Products	FN	402	(3)
Food Microbiology	MIC	320	(4)
Mammalian Endocrinology	AS	412	(4)
Food Chem & Toxicology	FN	420	(4)

Support and Directed Courses

(Animal Production/, Animal Agri-Business, and Dairy Science Options)

Management Accounting	ABM	324	(4)
Elem Organic Chem	CHM	201	(3)
Elem Organic Chem Lab	CHM	250	(1)
Trigonometry	MAT	106	(4)
Basic Microbiology	MIC	201	(5)
Basic Soil Science	SS	231	(4)

General Education

(Required of all Students

Freshman Comp	ENG	104	(4)
Freshman Comp	ENG	105	(4)
or			
Report Writing	COM	216	(4)
Advocacy & Argument	SP	204	(4)
College Algebra	MAT	105	(4)
College Chem	CHM	104	(3)
College Chem Lab	CHM	141	(1)
or			
Gen Chem	CHM	111	(3)
Gen Chem Lab	CHM	151	(1)
Basic Biology	BIO	115	(5)
College Chem	CHM	105	(3)
College Chem Lab	CHM	142	(1)
or			
Gen Chem	CHM	112	(3)
Gen Chem Lab	CHM	152	(1)
Agricultural Enterprise Mgmt	ABM	328	(4)
Prin Sociology	SOC	201	(4)
Comp Polit Sys	PLS	202	(4)
Gen Psychology	PSY	201	(4)
American Civiliz	AMC	201	(4)
or			
Intro Am Govt	PLS	201	(4)
American Civiliz	AMC	202	(4)
or			
U.S. History	HST	202	(4)
Genetics	BIO	303	(4)
Biochemistry	CHM	321	(4)
Arts (III, A)			(4)
Philosophy & History (III, B)			(4)
Literature & Foreign Languages (III, C)			(4)

ANIMAL SCIENCE MINOR COURSES

Animal Agricultural Science	AS	111	(4)
Feeds and Feeding	AS	101	(4)
Meat Science	AS	227	(3)
or			
Meat Utilization	AS	324	
Approved Animal Science Electives			(5)

Select one production course

Introd Beef Production	AS	131	(4)
Introd Sheep Production	AS	123	(4)
Dairy Science	AS	150	(4)
Dairy Goat Care and Management	AS	126	(3)

Select one production course

Introd Swine Production	AS	122	(4)
Poultry Principles	PS	131	(4)
Introd Horse Production	AS	125	(4)

Select 9 units of upper division Approved Animal Science Electives (9)

Course Descriptions

AS 101 Feeds and Feeding (4)

An introductory course treating the fundamentals of animal nutrition, the composition of feeds, feeding standards and their application to livestock production. 3 lectures, 1 two-hour activity.

AS 111 Animal Agricultural Science (4)

A study of the basic physiological, economic, environmental and nutritional considerations impacting on both the producer and consumer; the course deals with the role, production and use of animal products to resolve problems associated with world population and food production. 4 lectures.

AS 122 Introductory Swine Production (4)

History and development of swine industry. Types and breeds of swine. Hog production under California and Midwestern conditions. Common feeds used to supply nutrition requirements. Practice in handling, feeding, and selection. 3 lectures, 1 three-hour laboratory.

AS 123 Introductory Sheep Production (4)

Management of farm flocks of sheep with emphasis on common breeds, their identification and adaptation to California conditions. Principles of feeding, selecting, and evaluating sheep and their products. 3 lectures, 1 three-hour laboratory.

AS 124 Basic Equitation (3)

The fundamentals of the art of equitation. The anatomy of the horse as it pertains to riding. Equipment utilized in training and riding, care of the horse and safety precautions are emphasized. 1 lecture and 2 two-hour activities.

AS 125 Introductory Horse Production (4)

History, evolution, breeds and functions of horses. Basic principles of equine nutrition, reproduction, inheritance, disease and parasite prevention and control, skeletal and muscular form and function. 3 lectures, 1 three-hour laboratory.

AS 126 Dairy Goat Care and Management (3)

Management aspects of Dairy Goat production in California including breeds, selection and evaluation, nutrition, breeding, disease control and production. 3 lectures.

AS 128 Companion Animal Care (3)

A survey course to familiarize students with the routine problems encountered and the responsibilities involved in owning and caring for companion animals in a world where leisure time has provided increased incentive to own companion animals for recreational purposes. 3 lectures.

AS 131 Introductory Beef Production (4)

Survey of market beef production in the United States. Breed characteristics, grades and classes of market cattle and carcasses. Importance of by-products. 3 lectures, 1 three-hour laboratory.

AS 132 Light Horse Halter and Performance Evaluation (2)

Visual evaluation of various breeds of light horses at the halter and under saddle. Intensive training for intercollegiate horse judging competition. 1 lecture, 1 three-hour laboratory

AS 150 Dairy Science (4)

Selection, breeding, feeding, and management of dairy cattle. Dairy industry statistics and opportunities. 3 lectures, 1 three-hour laboratory.

AS 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AS 224 Intermediate Equitation (2)

A laboratory riding class allowing students to develop proficiency in the riding skills they have been exposed to in prior experience. 2 three-hour laboratories.

AS 227 Meat Science (3)

The practice of slaughtering and cutting of cattle, sheep and swine. Consideration of chemical composition, yields, grades, federal and state inspection and the fundamentals of curing and smoking meats. 2 lectures, 1 three-hour laboratory.

AS 234 Farrier Science (2)

Understanding the fundamentals of horseshoeing, anatomy and physiology of the horse's foot, pastern and leg. Caring for the horse's feet and legs, principles of horseshoeing and introduction to corrective shoeing. 2 lectures.

AS 235 Farrier Science (2)

Fundamentals of horseshoeing, anatomy and physiology of the horse's foot, pastern and leg. Trimming feet, fitting, milling shoes, principles of horseshoeing, an introduction to corrective shoeing. 2 three-hour laboratories. Prerequisite: AS 234 or concurrent enrollment in AS 234.

AS 240 Principles of Market Animal and Carcass Evaluation (4)

A study of the relationship between live meat animal evaluation and carcass evaluation. Visual appraisal techniques used in the quality and yield grading of live meat-type animals compared to the grading parameters used for carcass evaluation. Incorporates the effect of selection and management on body composition and live animal and carcass value. 2 lectures, 2 three-hour laboratories.

AS 241 Introductory Livestock Evaluation (2)

Instruction in selection of beef cattle, sheep, swine, and horses according to utility, type and breed. 2 three-hour laboratories.

AS 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

AS 301 Applied Dairy Nutrition (2)

Nutritional requirements of dairy cattle. Ration formulation through consideration of economic and nutritional factors. Feeding regimens as related to production. Prerequisite: AS 101, AS 150.

AS 303 Advanced Livestock Feeding (2)

Nutritional requirements for maintenance, growth, fattening, reproduction, and lactation. Calculation of efficient and economical rations. Biological and replacement value of feeds. Recent developments in feeding. 2 lectures. Prerequisite: AS 101.

AS 304 Ration Formulation (2)

Computerized least-cost formulation of rations for all species of domestic livestock. Relates the nutrient requirements to current feed costs for alternative formulation of least cost rations. 2 lectures. Prerequisites: AS 101, AS 303.

AS 305 Artificial Insemination of Domestic Animals (3)

Fundamentals and techniques used in the artificial breeding of cattle, sheep, swine and horses; physiological aspects of reproduction; evaluation of artificial insemination in the livestock industry. 2 lectures. 1 three-hour laboratory. Prerequisite: VS 206.

AS 306 Experimental Animal Methodology (4)

Fundamentals and techniques used in the breeding, feeding, care, management and experimentation with laboratory animals. Comparative studies of large versus small animals and the implications of recent findings derived from such studies. 3 lectures, 1 three-hour laboratory. Prerequisite: VS 205 or MIC 201.

AS 318 Livestock Management and the Environment (4)

Environmental impact of various livestock and livestock waste handling procedures. By-product fractionation, nutritive value and physiological hazards of pollutants generated by different management systems of livestock production. Practical programs incorporating animal wastes into production schemes. Government policies relating to pollution control. Prerequisite: Junior standing.

AS 320 Animal Production in the Tropics (3)

A consideration of factors influencing animal production in warm climates including environment, species characteristics, production techniques and technology transfer as influenced by economic, social and political considerations. 3 lectures.

AS 322 Commercial Swine Production (4)

Management of swine herd. Selection of breeding stock. Feeding and nutritional needs of swine. Market channels, cycles and production costs. Disease control and common diseases of swine. 3 lectures, 1 three-hour laboratory. Prerequisite: AS 101, 122.

AS 323 Sheep and Wool Technology (3)

Management of commercial feedlot and range sheep operations. Shearing, packing, grading, and marketing wool. Critical analysis of the economic characteristics of wool. 2 lectures, 1 three-hour laboratory. Prerequisite: AS 101, 123.

AS 324 Advanced Equitation (2)

Advanced training in equitation with emphasis on schooling techniques for horse and rider. Theory and practice of preparation for show ring competition. 3 two-hour laboratories. Prerequisite: Basic Equitation or consent of instructor.

AS 325 Horse Industry (3)

A comprehensive consideration of equine reproduction and breeding-farm management, including breeding complications, mating hygiene, disease and parasite detection, mare and stallion selection, records and office procedures of stallion stations. 3 lectures. Prerequisite: AS 125.

AS 327 Meat Utilization (3)

Introduction to the technology of meat processing and utilization including cutting, curing, smoking, wrapping, freezing and storage problems. Economic aspects of procurement, portion control and preparation, inspection and grading. 2 lectures, 1 three-hour laboratory.

AS 331 Beef Cattle Science (4)

The management of commercial and pure-bred cattle. Cost of production as affected by geographical location. Improvement of performance and breeding efficiency with emphasis on cattle fertility and performance testing. 3 lectures, 1 three-hour laboratory. Prerequisite: AS 131.

AS 335 Horsemanship (2)

Theory and practice of basic training principles and methods. Handling, training, grooming of the young foal and yearling. Instruction in long line training and ground driving. 2 three-hour laboratories. Prerequisite: AS 325.

AS 341 Livestock and Wool Evaluation (3)

Intensive evaluation of livestock and wool by use of carcass evaluation, records, of performance, fleece measurements, and standard breed type in preparation for intercollegiate competition. 3 three-hour laboratories. Prerequisite: AS 241.

AS 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AS 402 Animal Nutrition (4)

Metabolism of proteins, carbohydrates, fats, minerals, and vitamins. Relationship of proper nutrition to livestock production. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 321.

AS 403 Ruminant Nutrition (3)

Implications of recent findings in ruminant nutrition. The physiochemical processes of digestion and absorption. Metabolism and the importance of rumen microflora. Normal metabolism and abnormal metabolic disorders. Modes of action of feed additives. 3 lectures. Prerequisite: CHM 321.

AS 404 Animal Breeding (4)

Application of genetics to animal breeding. Systems of mating, use of inbreeding, crossbreeding and selection in improving farm animals. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 303.

AS 412 Mammalian Endocrinology (4)

A general course surveying the glands of internal secretion and their role in development, growth, metabolic regulation, lactation, and reproduction of animals. 4 lectures. Prerequisite: VS 205 or equivalent.

AS 413 Physiology of Lactation (3)

Physiology of milk secretions. Factors affecting production. Mechanical and natural removal of mammary gland secretions. 3 one-hour lectures. Prerequisite: VS 205 and AS 412 or equivalent.

AS 414 Reproductive Physiology of Food Animals (3)

A study of the physiological processes of reproduction from gametogenesis to parturition. The reproductive cycles of the food animals will be discussed. 3 lecture-discussions. Prerequisite: VS 205 or ZOO 324, and CHM 321.

AS 422 Feedlot Operations (2)

Management problems of commercial feedlots. Factors affecting efficiency and economy of gain. Procurement of livestock and feedstuffs. Disease control, record keeping, financing and physical plant. 2 lectures. Prerequisite: AS 303 and a minimum of one advanced production course.

AS 424 Nutritive Analysis (2)

Laboratory course involving the principles and practices in quantitative analysis of feedstuffs. 2 three-hour laboratories. Prerequisite: CHM 321.

AS 425 Equine Nutrition (3)

Anatomy of the digestive tract of the horse as it effects feeding practices. Nutrient requirements for maintenance, work, pregnancy, and lactation in the horse. Interpreting National Research Council "Nutrient Requirements For Horses". Assessing recent advances in horse nutrition. 3 lectures. Prerequisites: AS 101, AS 125.

AS 427 Meat Processing and Technology (5)

Manufacturing of processed meats, and meat products as related to processing operations, sanitation, product formulation, quality control, and smokehouse operations. 3 lectures, 2 three-hour laboratories. Prerequisite: AS 227, CHM 201.

AS 432 Advanced Animal Breeding (4)

Advanced principles in animal breeding including selection theory, heterosis, strain line and breed formation. 3 lectures, 1 three-hour laboratory. Prerequisites: AS 404.

AS 434 Farrier Problems (3)

Corrective and specialized horseshoeing. Instruction in constructing normal and corrective horseshoes and techniques in applying them. 1 lecture, 2 three-hour laboratories.

AS 441 Internship in Animal Science (1–16)

On-the-job training in animal science, providing collegiate level experiences in animal production, agri-business and related areas. Experiences may be useful for preparation of senior projects. Prerequisites: permission of coordinator required in advance.

AS 461, 462 Senior Project (2) (2)

Selection and completion of a project under a minimum of supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

AS 463 Undergraduate Seminar (2)

New methods and developments, practices, and procedures in the field. 2 lectures. Prerequisite: Senior standing.

AS 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory or a combination of both.

Poultry Science

PS 131 Poultry Principles (4)

Detailed consideration of avian anatomy and physiology as it affects production. Strain evaluation and selection, incubation, feeds and nutrition, sanitation and disease prevention and control. 3 lectures, 1 three-hour laboratory.

PS 231 Poultry Production (4)

The fundamentals of poultry production. Management, ration formulation, production facilities and marketing systems as they relate to various classes of poultry. 3 lectures, 1 three-hour laboratory. Prerequisite: PS 131.

PS 331 Poultry Marketing (4)

The fundamentals of poultry meat and egg marketing. Market channels, processing, and quality maintenance. Management and merchandising problems peculiar to the poultry industry. 3 lectures, 1 three-hour laboratory. Prerequisite: PS 231.

PS 431 Avian Physiology (3)

Detailed consideration of the physiology of avian species with emphasis on birds of economic importance to man. 3 lectures.

Veterinary Science

VS 205 Physiology of Domestic Animals (4)

Physiological processes of the organ systems of the animal body. Concepts of integrative and homeostatic mechanisms will be discussed. 4 lectures. Prerequisite: BIO 115.

VS 206 Anatomy of Domestic Animals (3)

Laboratory demonstrations and discussions involving the comparative anatomy of the skeleton, musculature and digestive systems of the horse, cow, sheep, and pig. 2 lectures, 1 three-hour laboratory. Prerequisite: BIO 115.

VS 301 Animal Diseases (3)

Study of factors contributing to animal diseases and their control. 3 lectures. Prerequisite: MIC 201.

VS 302 Animal Parasitology (4)

The study of animal parasites and their relationship to diseases and infestations of horses, cattle, sheep, swine, and poultry. 3 lectures, 1 three-hour laboratory.

VS 303 Poultry Diseases (3)

Consideration of the etiology, symptomatology, and control of infectious, nutritional, and parasitic diseases of poultry. 3 lectures.

VS 304 Immunological Procedures in Animal Production (3)

The application of immunology to disease control in farm animals; the use of immunological techniques in animal research; and potential as a tool in livestock production. 3 lectures. Prerequisite: VS 205.

Graduate courses are listed in the graduate section of the catalog.

FOODS AND NUTRITION

One of the two majors offered in the foods & nutrition/home economics department is foods and nutrition. For the other program offered in this department see home economics.

Ruby Beilby, *Chair*

Nenita Cabacungan — Anahid T. Crecelius — Ramiro C. Dutra
Kara F. Caldwell — Ruthanna Davis — Cheryl L. Loggins

A Bachelor of Science degree with a major in foods and nutrition prepares students for challenging and rewarding careers in dietetics, nutrition education, nutrition research, foodservice management, food technology, and food marketing and sales. In addition, the major provides a strong academic background for graduate study and research in foods and nutrition.

The curriculum emphasizes a structured yet diversified program of core and support classes that are based in the sciences. Courses provide practical laboratory experiences and a wide exposure to industry and related professions through field trips and off-campus learning experiences in such areas as food service, food technology and community nutrition.

The program has American Dietetic Association approval in all four areas of specialization: general, management, clinical, and community. Students pursuing career goals in the dietetics field qualify for post-graduate internships and/or graduate programs which can lead to membership in the American Dietetic Association and eligibility to take an examination to become a Registered Dietician.

Courses are taught in modern and fully equipped foods, nutrition, and quantity foods laboratories. The foods and nutrition faculty have diversified education and experience in such areas as hospital dietetics, foodservice management, public health nutrition, food technology, and nutrition research.

High school students planning to major in foods and nutrition are advised to build a background in foods, chemistry and biology. Community college students should concentrate on chemistry (including organic), biology (including bacteriology), communication skills and general education.

The curriculum, facilities, and faculty reflect the Foods and Nutrition and Home Economics Department's commitment to a strong, up-to-date science-based undergraduate program that provides the types of skills and knowledge needed by graduates to meet professional goals.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Foods	FN	121	(4)
Meal Management	FN	221	(4)
Nutrition	FN	235	(4)
Nutrition Laboratory	FN	236	(1)
Food Technology	FN	317	(4)
Experimental Foods	FN	321	(4)
Cultural Aspects of Food	FN	328	(3)
Nutrition of The Life Cycle	FN	335	(3)
Community Nutrition	FN	346	(3)
Quantity Food Preparation	FN	351	(4)
Food Procurement	FN	354	(3)
Food Chemistry and Toxicology	FN	420	(4)
Advanced Nutrition	FN	433	(4)
Advanced Nutrition	FN	434	(4)
Diet Therapy	FN	443	(4)
Nutritional Assessment-Biochemical	FN	445	(2)
Institutional Management	FN	452	(3)
Food Service Design	FN	453	(4)
Computer Applications in the Food Service Industry	FN	455	(2)
Senior Project	FN	461	(2)
Senior Project	FN	462	(2)
Undergraduate Seminar	FN	463	(2)

SUPPORT & ELECTIVE COURSES

(Required of all students)

Management Accounting	ABM	324	(4)
Personnel Management	ABM	402	(3)
Fundamentals of Household Equipment & Materials	AE	102	(4)
American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Introduction to Cultural Anthropology	ANT	102	(4)
or Intro to Sociology	SOC	201	
Meats Utilization	AS	327	(4)
Basic Biology	BIO	115	(5)
College Chemistry	CHM	104	(3)
College Chemistry	CHM	105	(3)
College Chemistry Lab	CHM	141	(1)
College Chemistry Lab	CHM	142	(1)
Elements of Organic Chemistry	CHM	201	(3)
Organic Chemistry Lab	CHM	250	(1)
Biochemistry	CHM	321	(4)
Report Writing	COM	216	(4)
Introduction to Computing	CIS	110	(4)
Principles of Economics	EC	201	(4)
or Principle of Economics	EC	202	(4)
Freshman Composition	ENG	104	(4)
College Algebra	MAT	105	(4)
Basic Microbiology	MIC	201	(5)
Food Microbiology	MIC	320	(4)
Intro to Statistics	STA	107	(4)
General Psychology	PSY	201	(4)
Educational Psychology	PSY	340	(4)
or Psychological Foundations of Education	TEP	393	(3)
Advocacy and Argument	SP	204	(4)
Human Physiology	ZOO	235	(4)
Arts (Cat. III A from approved department list)			(4)
Literature & Foreign Language (Cat. III C)			(4)
Philosophy & History (Cat. III B from approved department list)			(4)
Political & History (Cat. IV C)			(4)
Unrestricted Electives			(15–16)

Course Descriptions

FN 121 Introduction to Foods (4)

Scientific principles and techniques of basic food preparation by categories. Elements of food sanitation, legislation, and consumer choices. 2 lectures, 2 three-hours laboratories.

FN 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

FN 205 Contemporary Aspects of Nutrition (4)

The modern concept of nutrition as related to diet and body function emphasizing the requirements during adolescence and adulthood. Nutrition and physical activity. Nutrients in foods and their utilization in the body. 4 lectures. For students not majoring in Foods and Nutrition.

FN 210 Microwave Food Preparation (2)

Principles of operation of the microwave oven; techniques of preparation and evaluation of various food groups in microwave cookery. 1 lecture, 1 laboratory.

FN 221 Meal Management (4)

Planning, preparation and service of nutritious, economical and palatable meals for families and community groups. Management of time, energy and money in contemporary meal situations. 2 lectures, 2 three-hour laboratories. Prerequisite: FN 121 or equivalent or consent of instructor.

FN 235 Nutrition (3)

Role of the carbohydrates, lipids, proteins, minerals, vitamins and water, in human nutrition. Dietary standards and recommended allowances. 3 lectures. Prerequisite: CHM 201, 250 or equivalent, ZOO 235. Concurrent FN 236.

FN 236 Nutrition Laboratory (1)

Introduction to techniques and experiments used in nutrient analysis in foods and nutritional assessment in living organisms. 1 three-hour laboratory. Prerequisites: CHM 201, 250 or equivalent, ZOO 235: concurrent FN 235.

FN 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory or a combination of both.

FN 317 Food Technology (4)

Principles of food processing including refrigeration, freezing, dehydration, canning, and fermentation as they relate to the technology of foods and beverages. Introduction to oenology. Field trips. 3 lectures, 1 three-hour laboratory. Prerequisite: MIC 201 or equivalent.

FN 321 Experimental Foods (4)

Application of the experimental approach to food preparation. Independent studies. 2 lectures, 2 three-hour laboratories. Prerequisite: FN 121, CHM 201, 250.

FN 328 Cultural Aspects of Food (3)

Relation of physical environment, technology, religion, social institutions and other aspects of culture to food patterns. Selected culture groups around the world and regions in the United States are studied. Typical dishes are prepared and evaluated. 2 lectures, three-hour laboratory.

FN 335 Nutrition of the Life Cycle (3)

Nutritional needs of pregnancy, lactation, childhood, adolescence, adulthood and the aged. Planning and computation of normal diets for all phases of the life cycle. 3 lectures. Prerequisite: FN 205 or FN 235.

FN 346 Community Nutrition (3)

Types of nutritional surveys. Economics and nutrition. Food fads and fallacies. Role of nutritionist in community nutrition programs. Laboratory assignments include outreach nutrition project in community. 2 lectures. 1 three-hour laboratory. Prerequisites: FN 205 or FN 235, FN 221, CHM 321 or consent of instructor.

FN 351 Quantity Food Preparation (4)

Principles and practices in planning, preparing and serving food for the foodservice industry with emphasis on recipes, menus, cost controls, job specifications and sanitation. Practicum on campus with quantity equipment and in affiliated schools, hospitals, nursing homes and in-plant feeding. 2 lectures, 2 three-hour laboratories. Prerequisite: FN 121, FN 221, or consent of instructor.

FN 354 Food Procurement (3)

Principles of purchasing for the food service industry. Study of regulatory agencies, grading and distribution channels. Familiarization of companies operating in the area. Preparation of specifications, receiving and storage procedures. 2 lectures, 1 three-hour laboratory. Prerequisite: FN 121.

FN 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credits limited to 4 units, with a maximum of 2 units per quarter.

FN 418 Sensory Evaluation of Foods (3)

Description: Methods of sensory evaluation of food products. Applications to quality assurance, technical services and new product development. 3 lectures. Prerequisite: STA 107.

FN 420 Food Chemistry and Toxicology (4)

Chemical composition of foods. Chemical changes occurring during processing and storage. Detection of deterioration, adulteration and contamination with toxic materials. Laboratory analysis of various types of food. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 201, 250.

FN 421 Recipe Development and Food Presentation (2)

Sources of recipes, testing procedures, recipe writing, development of recipe brochure, including food photography. 1 lecture, 1 three-hour laboratory. Prerequisite: FN 121 or consent of instructor.

FN 433 Advanced Nutrition (4)

Metabolic, physiological and biochemical functions of nutrients on the cellular level. Understanding the functions of the various sub-cellular components and their role in maintaining a healthy organism. 3 lectures, 1 lecture/activity. Prerequisite: CHM 321, FN 235, and ZOO 235. To be taken concurrently with FN 445.

FN 434 Advanced Nutrition (4)

Hormonal effects upon nutrient absorption, transport and utilization. Hormonal interactions and their effects on metabolism and diseases of hormonal origin. 3 lectures, 1 lecture/activity. Prerequisite: FN 433.

FN 441, 442 Internship in Foods and Nutrition (1-8) (1-8)

On-the-job training in foods and nutrition, providing professional level experiences in food service, community nutrition, research, and quality control. Experiences may be useful for preparation of senior projects. Prerequisite: permission of coordinator required in advance.

FN 443 Diet Therapy (4)

Relationship between diet and health with particular emphasis on specific dietary requirements associated with certain diseases and conditions. 3 lectures, 1 three-hour laboratory. Prerequisite: FN 433, FN 445.

FN 444 Diet Therapy (3)

Relationship between diet and health with particular emphasis on specific dietary requirements associated with certain diseases and conditions. 3 lectures. Prerequisites: FN 443.

FN 445 Nutritional Assessment-Biochemical (2)

Evaluation of nutritional status by laboratory methods. Biochemical tests performed in hospitals, commercial or other laboratories to measure levels of nutrients in biological fluids. 1 lecture, 1 three-hour laboratory. To be taken concurrently with FN 433.

FN 452 Institutional Management (3)

Relationship of budget, staff allocation and training to operational objectives and management principles. Effect of contemporary legislation on foodservice. Career management. Development of proposal for design of a foodservice department. 2 lectures, 1 three-hour laboratory. Prerequisite: FN 351 or FN 337.

FN 453 Food Service Design (4)

Development of a sophisticated plan reflective of current industry practices using foodservice proposal written in FN 452. Use of scale, mylar, templets, specifications and blueprints. Development of a subsystem within the plan. Plan review by industry professionals. 2 lectures, 2 three-hour laboratories. Prerequisites: FN 337 or FN 452.

FN 455 Computer Applications in the Foodservice Industry (2)

Structure and use of data files in preparing information for foodservice systems. Interpretation and utilization of computer-generated reports. Four hours activity. Prerequisite: CIS 110, FN 351.

FN 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time.

FN 463 Undergraduate Seminar (2)

Student study and presentation of new methods and developments, practices, and procedures in the fields of specialization in foods and nutrition. 2 meetings. Prerequisite: Consent of Senior Project Advisor.

FN 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title of be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

FRUIT INDUSTRIES

One of the four majors offered in the plant and soil sciences department is fruit industries. For other programs in this department see agricultural biology, agronomy, and soil science.

Robert J. Tullock, *Chair, Plant and Soil Science Department*

Gregory J. Partida, Jr., *Coordinator, Fruit Industries*

Edwin A. Barnes, III

The Fruit Industries curriculum provides students with a practical and scientific background in the production, management, processing and marketing of fresh citrus, avocados, subtropical fruits, and deciduous fruit and nut crops. This major is designed to provide students with both the skills and knowledge of orchard operations, as well as a scientific and business-oriented background that enables the graduate to readily enter the industry.

One of the unique features offered to Fruit Industries students is the opportunity to develop and apply their expertise and knowledge in the actual orchard operations of the 50 acres of fruit trees managed by Cal Poly, and the 53 acres located at Pine Tree Ranch in Ventura County.

Students are encouraged to participate in part-time jobs and in-service training programs in orchard management at Cal Poly and Pine Tree Ranch. Opportunities are also available for enterprising students to conduct individual or group orchard projects which provide valuable training in fruit production. A profit-sharing plan is part of this type of student project.

Fruit Industries graduates are in demand in this major California industry. Particular emphasis is placed on meeting the personnel needs of the citrus and avocado industries. The career areas for which men and women graduates qualify are in management of orchard production operations; the agricultural chemical industry; county, state and federal agencies; packinghouse and marketing management positions; and in the varied agri-businesses serving the fruit industries of California.

CORE COURSES FOR MAJOR

(Required of all students)

Irrigation	AE	240	(4)
Insect Pests Tree Crops	AGB	229	(4)
Principles of Pest Management	AGB	231	(3)
Crop Management Operations	AGR	437	(3)
Fruit Science Fundamentals	FI	101	(3)
Citrus Production	FI	102	(4)
Citrus Production	FI	103	(4)
Avocado Production	FI	201	(4)
Pomology	FI	203	(4)
Citrus Diseases	FI	226	(4)
Fruit Propagation	FI	245	(1)
Fruit Propagation	FI	246	(1)
Advanced Pomology	FI	303	(4)
Citrus and Avocado Marketing	FI	321	(4)
Fruit Processing and Handling	FI	322	(4)
Packinghouse Management	FI	323	(3)
Orchard Management Practices	FI	341	(3)
Senior Project	FI	461	(2)
Senior Project	FI	462	(2)
Undergraduate Seminar	FI	463	(2)
Soil Management	SS	232	(4)
Soil and Plant Analysis	SS	339	(3)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Management Accounting	ABM	324*	(4)
Ag Enterprise Acctg	ABM	340	(4)
Personnel Management	ABM	402	(3)
Surveying Fundamentals	AE	131	(2)
Tractors	AE	241	(2)
Introduction to Arthropods	AGB	165	(4)
Agricultural Laws and Regulations	AGB	301	(3)
Vert Pest Mgmt	AGB	323	(4)
Produce Mkt Quality	AGB	325	(3)
Weeds and Weed Control	AGR	233	(4)
Basic Biology	BIO	115	(5)
Plant Structures and Functions	BOT	124	(5)
General Plant Pathology	BOT	323*	(4)
Plant Physiology	BOT	422*	(5)
College Chemistry	CHM	104*	(3)
College Chemistry	CHM	105*	(3)
College Chemistry Lab	CHM	141*	(1)
College Chemistry Lab	CHM	142*	(1)
Elements of Organic Chemistry	CHM	201	(3)
Organic Chemistry Lab	CHM	250	(1)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Trigonometry	MAT	106	(4)
Advocacy and Argument	SP	204*	(4)
Basic Soil Science	SS	231	(4)
Soil Fertility and Fertilizers	SS	233	(4)
Agricultural Engineering (See Advisor)			(2)
American Civilization	AMC	201*	(4)
or			
Introduction to American Government	PLS	201	
American Civilization	AMC	202*	(4)
or			
U.S. History	HST	202	
Vertebrate Pest Management	AGB	323	(4)
Produce Market Quality	AGB	325	(3)
Communication in the English Language		*	(8)
Humanities		*	(12)
Social Sciences		*	(8)
Integrated Being		*	(4)
Electives			(10)

* MAY BE USED FOR GENERAL EDUCATION REQUIREMENTS

Course Descriptions

FI 101 Fruit Science Fundamentals (3)

Critical evaluation of the role of fruit crops in society. Historical development, economic importance and cultural practices common to all fruit crops. Site selection, orchard planning, variety and rootstock selection, propagation, fertilization, irrigation, pest and disease control, pruning and training, harvesting and marketing of fruit crops. 3 lectures.

FI 102 Citrus Production (4)

Economic importance of the citrus industry. Historical development, areas of production, environmental requirements and citrus climatology, citrus botany, commercial varieties and rootstocks. 3 lectures, 1 three-hour laboratory.

FI 103 Citrus Production (4)

Critical evaluation and comparison of citrus production practices from commercial citrus regions around the world. Orchard planning and development, nursery practices, tree management, pest and disease control, irrigation and fertilization, pruning, harvesting and marketing. 3 lectures, 1 three-hour laboratory. Prerequisite: FI 102.

FI 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected historical or contemporary problems in the production of fruit in California or in other areas of the world. Total credit limited to 4 units, with a maximum of 2 units per quarter.

FI 201 Avocado Production (4)

Critical evaluation of historical and future trends in the development of the avocado industry in California. Analytical investigation of an avocado orchard site selection, environmental requirements, variety adaptions, orchard management, cultural requirements, production practices, and economics of producing avocados in western societies. 3 lectures, 1 three-hour laboratory.

FI 202 Subtropical Fruits (4)

Historical significance and contemporary importance of subtropical fruits including the date, fig, macadamia, olive, and other selected fruits for commercial plantings in California and other areas of the United States. Critical evaluation of the climatic and cultural requirements, fruiting and growth habits, and varietal characteristics of the selected fruits from western and non-western societies. 3 lectures, 1 three-hour laboratory.

FI 203 Pomology (4)

Economic importance of California's deciduous fruit and nut orchards. Critical evaluation of the cultural requirements of deciduous fruit and nut orchards in California and other areas of the United States, varieties, seasonal production practices, and tree climatic requirements. 3 lectures, 1 three-hour laboratory.

FI 226 Citrus Diseases (4)

Philosophy of citrus disease control and prevention. Identification of causal agents, economic impact, critical evaluation of the basic concepts and scientific methodologies involved in control and prevention. 3 lectures, 1 three-hour laboratory. Prerequisite: BOT 323, FI 103.

FI 245 Fruit Propagation (1)

Critical evaluation of the basic concepts and scientific methodologies used in topworking and grafting fruit plants, types of grafts, selection of propagating material and maintenance of propagated material. 1 three-hour laboratory.

FI 246 Fruit Propagation (1)

Critical evaluation of the basic concepts and scientific methodologies used in nursery propagation of fruit plants including budding, tipgrafting cuttings, seedbed preparation, care and management of the nursery. 1 three-hour laboratory.

FI 299 Special Topics for Lower Division Students (1–4)

Group study of contemporary selected topics related to basic concepts and scientific methodologies used in fruit production in western and non-western societies. The title to be specified in advance. Total credit is limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of instructor. Instruction is by lecture, laboratory, or a combination of both.

FI 301 Horticultural Characteristics of Fruit Trees (3)

Critical evaluation of the basic concepts and philosophies used in growing fruit under non-commercial conditions. Common varieties for backyard situations, seasonal availability, common horticultural characteristics, basic cultural practices, and environmental needs under California conditions. Not recommended for FI majors. 3 lectures.

FI 303 Advanced Pomology (4)

Critical evaluation of the climatic and cultural requirements of fruit tree orchards, strawberries, kiwifruit, olives and other selected small fruits. The basic concepts and scientific methodologies used in the production, processing, and marketing of raisins and table and wine grapes including the techniques of irrigation, orchard layout, planting, training, pruning, pollination, fruitset, thinning, pest control, and the use of girdling and plant growth regulators to size fruit in vineyards and orchards. 3 lectures, 1 three-hour laboratory. Prerequisite: FI 203.

FI 321 Citrus and Avocado Marketing (3)

Critical evaluation of the procedures involved in local, national and international marketing of avocado and citrus varieties. Historical development, organization, economic importance, and function of cooperative and independent marketing organizations. 3 lectures. Prerequisites: FI 102, 201.

FI 322 Fruit Processing and Handling (4)

Critical evaluation of physical operations involved in fruit and nut harvesting, processing, and packing. Equipment used in harvesting, handling, transporting, grading, sorting, packing and shipping of fruits and nuts. Fruit and nut storage, storage diseases, and techniques used to prolong storage life. 3 lectures, 1 three-hour laboratory. Prerequisite: FI 226.

FI 323 Packinghouse Management (3)

Evaluation of the management decision-making process in fruit packinghouse operations. Laws and regulatory aspects of fruit quality, grades, and standards of fresh fruit and manufactured products. Economics of seasonal pools, pro-rate system, national and international marketing. 2 lectures, 1 three-hour laboratory. Prerequisite: FI 322.

FI 341 Orchard Management Practices (3)

Practical application of the basic concepts and scientific methodologies used in orchard cultural practices and procedures. Importance of seasonal operations in relation to overall objectives in orchard management. Use of specialized orchard equipment emphasized. Prerequisites: AE 241 and any fruit production course, or consent of instructor.

FI 400 Special Problems for Upper Division Students (1-2)

Individual or group investigations, research, studies, or survey of selected historical or contemporary problems in the production of fruit in California or in other areas of the world. Total credit limited to 4 units, with a maximum of 2 units per quarter.

FI 425 Advanced Propagation (2)

Advanced propagation will incorporate the propagation techniques and methods used in FI 245 and FI 246. Students in this course will be required to use the modern techniques and methods learned to complete a propagation project. Projects may include topworking or grafting trees to new varieties, or budding or tipgrafting cuttings in the nursery to selected budwood. 2 three-hour laboratories. Prerequisites: FI 245 and FI 246.

FI 441 Internship in Orchard Management (12) FWSpSu

On-the-job training in orchard maintenance and cultural practices. One quarter in residence at Pine Tree Ranch in Ventura County or any other orchard property with similar training opportunities. Actual operation of a commercial orchard enterprise under University faculty or staff supervision. Prerequisites: FI 103, FI 201, AE 241 recommended; and permission of section coordinator.

FI 461, 462 Senior Project (2) (2)

An analytical investigation of a fruit industries research project in an area of special interest to the individual student working under faculty supervision, culminating in a formal, rhetorical expository report that emphasizes clarity and lucidity of though based on deductive and inductive reasoning, and the use of graphic skills. Prerequisite: Senior standing.

FI 463 Undergraduate Seminar (2)

Critical review of contemporary research in the field of pomology. The student will analyze, criticize and advocate by inductive and deductive methods that inferences in contemporary literature are based on fact or logical, unambiguous extension of fact. Oral reports of contemporary literature and senior projects are required. 2 lectures. Prerequisite: Senior Standing.

FI 499 Special Topics for Upper Division Students (1-4)

Group study of contemporary selected topics related to basic concepts and scientific methodologies used in fruit production in western and non-western societies. The title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of instructor. Instruction is by lecture, laboratory, or a combination of both.

HOME ECONOMICS

One of the two majors offered in the foods & nutrition/home economics department is home economics. For the other program offered in this department see foods and nutrition.

Ruby Beilby, *Chair*

Bonnita Farmer Jean Gipe Ruby L. Trow

Elizabeth K. Tracy

The home economics profession has one common goal: to improve the quality of life for every person with special emphasis on the family. Home economists are needed to inform, interpret and explain the problems that arise out of technological advances as they relate to everyday living. The major is organized in several areas: Clothing and textiles; equipment, housing, and interiors; foods and nutrition; home management, family economics and consumer education; child development and family relations. Graduates find jobs with business, government and community agencies in such areas as fashion merchandising, interior design, child care services, food services, teaching, equipment consulting, consumer services, and other areas of the business world.

Students may gain professional experience through internships in business, government, and education. The California State Credential for secondary school teachers of home economics may be obtained with additional work through the Teacher Preparation Center. Students in Early Childhood Education may qualify as teachers in state licensed preschools.

Faculty advisors work closely with students in selecting courses related to career goals. With faculty approval, students choose 28 directed elective units in one of the six following areas of emphasis: general business, interior design, fashion merchandising and design, foods in business, secondary education or early childhood education.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Foods	FN	121	(4)
Meal Management	FN	221	(4)
Contemporary Aspects of Nutrition	FN	205	(4)
or			
Nutrition	FN	235	(3)
and Nutrition Laboratory	FN	236	(1)
Clothing Construction	HE	130	(4)
Art of Clothing Selection	HE	137	(4)
Introduction to Textile Science	HE	188	(4)
Interior Design Lab	HE	223	(2)
Custom Clothing Techniques	HE	230	(4)
or			
Constr Tech for Knitted Fabrics	HE	235	(4)
Family Consumerism	HE	245	(4)
Interior Design and Furnishings	HE	323	(3)
Household Equipment	HE	325	(4)
Home Management	HE	342	(4)
Demonstration Techniques	HE	390	(2)
Family Housing & Environ	HE	420	(4)
Family Finance	HE	440	(4)
Senior Project	HE	461	(2)
Senior Project	HE	462	(2)
Undergraduate Seminar	HE	463	(2)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Fundamentals of Household Equipment and Materials	AE	102	(4)
American Civilization	AMC	201	(4)
or			
Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or			
U.S. History	HST	202	
Basic Biology	BIO	115	(5)
Consumer Chemistry	CHM	101	(4)
or			
College Chemistry	CHM	104	(3)
and			
College Chemistry Lab	CHM	141	(1)
Freshman Composition	ENG	104	(4)
Freshman Composition	ENG	105	(4)
Advanced Writing*	ENG	301	(4)
or			
Advanced Writing	ENG	303	
College Algebra	MAT	105	(4)
or			
Intro to Statistics	STA	107	
General Psychology	PSY	201	(4)
Child Psychology	PSY	310 *	(4)
Principles of Sociology	SOC	201	(4)
Family as Social Institution	SOC	321 *	(4)
Advocacy & Argument	SP	204	(4)
Human Physiology	ZOO	235	(4)
Arts (Cat. III A) any Art or Env course			(4)
Economics (Cat. IV A from approved department list			(4)
Literature & Foreign Language (Cat. III C) any course from GE List			(4)
Philosophy & History (Cat. III B)			(4)
History of Women	HST	416 *	(4)
Directed electives (with consent of department advisor)			(28)
Unrestricted electives			(28)

* Students must take one of these courses to satisfy the upper division GE requirement.

Teacher education candidates must take HE 390, HE 215 or HE 315 and PE 306. HE 443, HE 453 and HE 454 are required for the HE credential and may be taken in the fifth year.

Course Descriptions

HE 130 Clothing Construction (4)

Techniques and equipment used in garment construction, 2 lectures, 4 hours activity.

HE 131 Sewing for Non-Majors (2)

Techniques and equipment used in clothing construction, for varied levels of previous sewing experience. 2 two-hour activity periods.

HE 137 Art of Clothing Selection (4)

Study of human body design as related to aesthetic and economic choices of clothing design for self-expression. Analaysis of classical design and art principles, sociological, psychological and historical influences on western and non-western dress. Individual experience in making personal selections of clothing design. 4 lectures.

HE 188 Introduction to Textile Science (4)

Introductory study of the chemical and physical properties of textile fibers, dyes and finishes; basic fabric geometry including yarn and Fabric structure; methodologies for evaluating textile properties and performance. 3 lectures, 1-3 hour laboratory.

HE 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

HE 215 Early Childhood Principles and Practices (4)

Application of principles and concepts of child growth and development in socialization of pre-school children in the group care and parenting setting, observation and participation in local pre-school programs. 3 lectures, 1 laboratory.

HE 223 Interior Design Lab (2)

Color and design principles as applied to interiors. Experimental application of theories. 2 three-hour laboratories.

HE 230 Custom Clothing Techniques (4)

Advanced and couture construction techniques. Evaluation of techniques and equipment for fabrics with special characteristics. 2 lectures, 4 hours activity. Prerequisite: HE 130 or consent of instructor.

HE 235 Construction Techniques for Knitted Fabrics (4)

Construction methods for knitted fabrics including finishes and variations of shirts and tops, pants, lingerie and swimwear. 2 lectures, 4 hours activity. Prerequisite: HE 130 or consent of instructor.

HE 245 Family Consumerism (4)

The family viewed as a consumer unit within contemporary society including the social, political and economic impact of family decision-making and resource allocation. 4 lectures.

HE 285 Creative Textiles (2)

Methods of creating textiles. Application of color and design principles to textile design and decorative techniques. 1 lecture, 1 two-hour activity.

HE 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

HE 307 Institutional Interiors (3)

Selection, care and use of materials for hotel, restaurant and institution interiors. Product availability, design, purchase, installation and maintenance. 3 lectures.

HE 315 Early Childhood Programs and Activities (3)

Examination of early childhood programs, and methods; creative activities including the areas of arts and crafts, science, social studies, rhythmic and large muscle movement; participation in local preschool programs. 2 lectures, 1 three-hour laboratory. Prerequisite: HE 215 or consent of instructor.

HE 323 Interior Design and Furnishings (3)

Product information on furnishings, textiles, accessories, and architectural materials related to interior design. Discussion of common interior design problems such as window and wall treatments, flooring and furniture selection, etc., based on individual and family needs. 3 lectures. Prerequisite: HE 223 or consent of instructor.

HE 325 Household Equipment (4)

Current developments in equipment used in the home; selection, use, and care of household equipment. 3 lectures, 1 laboratory.

HE 330 Pattern Drafting in Clothing Construction (4)

Drafting of basic patterns for individualized fit including bodice, sleeve, skirt and pants. Designing through flat pattern methods. 2 lectures, 4 hours activity. Prerequisite: HE 130 or consent of instructor.

HE 337 Applied Interior Design Techniques (2)

Construction, estimates, resources, materials, and styles as related to draperies, reupholstery, bed coverings and home accessories. 2 lectures.

HE 342 Home Management (4)

Introductory study of the economic, social and institutional forces that influence management of home and family. Management principles in relation to use of family resources, the consumer's role, family values and goals, problem solving, and decision making. 4 lectures.

HE 390 Demonstration Techniques (2)

Practice in techniques used in promotional and educational demonstrations in the areas of foods, household equipment, interiors and clothing for live and video-taped audiences. 1 lecture, 2 hours activity.

HE 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

HE 415 Organization and Management of Preschool Programs (4)

Types of preschool programs; physical facilities, budget and personnel needs and responsibilities. State and local regulations. Arranged lab in local preschools. 3 lectures, 1 three-hour laboratory. Prerequisite: HE 315, or consent of instructor.

HE 420 Family Housing and Environment (4)

The housing market as it relates to family, social and economic needs. Construction methods and materials including the study of historic housing design. Relationship between family housing and total environment. 4 lectures.

HE 423 Advanced Interiors and Furnishings (4)

Advanced study of design and furnishings with emphasis on functional planning for residences. Historical style development of furniture and textiles. Changing cultural patterns, materials and methods, designers and philosophies. 3 lectures, 1 three-hour laboratory. Prerequisite: HE 323 or equivalent.

HE 426 Professional Practices for Interior Designers (2)

Client and designer responsibilities. Consultations and fees, business forms, record keeping, resources and materials, free lance opportunities and public relations. 2 lectures.

HE 430 Tailoring Techniques (4)

Principles and techniques used in hand, machine and speed tailoring of coats and suits. Style, fabric, findings, construction methods. 2 lectures, 4 hours activity. Prerequisite: HE 130, or consent of instructor.

HE 435 Advanced Construction Techniques for Knitted Fabrics (2)

Advanced variations of knit fabric techniques for shirts and lingerie; men's wear, including pants and jackets; 2 lectures. Prerequisite: HE 235 or consent on instructor.

HE 440 Family Finance (4)

Money management as it concerns family goals and values. Areas included are expenditures for insurance, investments, shelter, transportation, and recreation. 4 lectures.

HE 441, 442 Internship in Home Economics (1–8) (1–8)

On-the-job training in home economics, providing professional level experiences in home economics-oriented positions in the business world and leading to the necessary contacts so helpful to future employment. Experiences may be useful for preparation of senior projects. Prerequisites: permission of coordinator required in advance.

HE 443 Management Problems of the Aged and Handicapped (3)

Special management problems of the aged, physically handicapped homemakers, and economically disadvantaged families. Application of management principles and concepts. Laboratory experience consists of field work in the community. 2 lectures, 1 three-hour laboratory. Prerequisite: HE 342 or consent of instructor.

HE 453 Home Economics Gainful Employment Program (4)

Development of gainful employment programs. Selection of participants, work experiences and advisory committees. Program management and evaluation. Career analysis and advisement. 4 lectures. Prerequisite: upper division standing.

HE 454 Curriculum in Consumer and Homemaking Education (3)

Curriculum design and use; development of a rationale, instructional objectives, assessment measures, learning activities and content generalizations, writing learning activity packages, techniques of individualized instruction. 3 lectures. Prerequisite: TEP 391 or equivalent.

HE 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results presented in formal report. Minimum 120 hours total time.

HE 463 Undergraduate Seminar (2)

Trends, current concepts, and developments in Home Economics, presentation of senior project. 2 lectures. Prerequisite: consent of senior project advisor.

HE 473 Fashion Merchandising (4)

Impact of fashion and style trends on merchandising; product information on department store items; use of selling and display to attract the consumer; and function of fashion oriented personnel. 4 lectures. Prerequisite: upper division standing.

HE 488 Textile Science (4)

Current developments and research in textiles. Evaluation of chemical and physical properties of fibers, fabrics, dyes and finishes. 3 lectures, 1 three-hour laboratory. Prerequisite: HE 188.

HE 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

INTERNATIONAL AGRICULTURE

One of the two majors offered in the agricultural business management department is international agriculture. For the other program offered in the department, see agricultural business management.

Recent studies of world resources indicate a growing need that known agricultural technologies be integrated into each country's own situation. The need for capable and well trained people to effect these changes is expanding. Opportunities exist for both the domestic student as well as the foreign national trained in this major. This university is uniquely suited to offer the program in international agriculture because of its agricultural facilities, faculty, and programs and its easy accessibility to the large number of U.S. firms with international agriculture interests located in or near Los Angeles County.

The international agriculture major is designed to train students for employment with firms that do or plan to operate internationally at the beginning management level in either the production or marketing (sales) phase of the business. The flexibility in the course of study that is available is developed by the student in consultation with a departmental advisor. The production phase can include livestock and/or plants with the respective ancillary support courses of farm mechanization, pest control, irrigation, soils, fertilization, etc. The marketing (sales) phase includes an additional emphasis on the business aspects applied to different economic and political entities.

The specific studies in agriculture selected are intensive and designed to develop in each student, regardless of his/her background in agriculture, the knowledge and skills necessary for proficiency in the field. The program is designed to create an awareness and appreciation of the complex problems related to population growth and agricultural development especially in lesser developed countries. In addition, the international agriculture student's curriculum deals with an international core of world studies and a specialization in one agricultural area. Students will become fluent in at least one foreign language and will be familiar with the cultures of the world region in which they intend to work to make them an effective force in the international agriculture field.

Added practical experience working in a foreign country also is a part of the program. Each student may spend from three to six months working for a firm or educational institution. Typically the cooperating firms or educational institutions have been in Central and South America. Graduates of this major also are qualified for employment in the Peace Corps and other similar volunteer programs.

CORE COURSES FOR MAJOR

(Required of all students)

Agricultural Marketing	ABM	304	(3)
Introduction to Agricultural Data Mgmt	ABM	375	(4)
Irrigation	AE	240	(4)
Introduction to Plant Science	AGR	111	(4)
Irrigated Pastures	AGR	333	(4)
Feeds and Feeding	AS	101	(4)
Animal Production in The Tropics	AS	320	(3)
World Agricultural Resources	IA	101	(4)
Int. Ag. Org. Struc	IA	301	(4)
Agricultural Mkt. Develop	IA	302	(4)
Ag. Land & Proj. Plan	IA	303	(3)
Intl Mktng of Agriculture Prod	IA/ ABM	330	(3)
Ag Water Res Util	IA/ ABM	350	(3)
Ag Co-ops	IA/ ABM	360	(3)
Ag Policy in Develop Nations	IA	362	(3)
Seminar in Tropical Agriculture	IA	371	(1)
Farm Management in Low Income Agriculture	IA	380	(3)
Rural Community Development	IA	382	(3)
Summer Field Experience	IA	401	(3)
Senior Project	IA	461	(2)
Senior Project	IA	462	(2)
Undergraduate Seminar	IA	463	(2)
Basic Soil Science	SS	231	(4)
Courses to complete major (Advisor and department approval required)			(10)

SUPPORT AND ELECTIVE COURSES

Complete minimum of 17 units from the following

Contemporary Economic Problems of Agriculture	ABM	300	(3)
Supervision & Training	ABM	203	(2)
Agricultural Production Economics	ABM	311	(4)
Management Accounting	ABM	324	(4)
Agricultural Financial Analysis	ABM	325	(3)
Agricultural Enterprise Management	ABM	328	(4)
Introduction to Arthropods	AGB	165	(4)
Principles of Pest Management	AGB	231	(3)
Principles of Economics	EC	202	(4)

(required of all students)

American Civilization	AMC	201	(4)
or Introduction to American Government	PLS	201	(4)
American Civilization	AMC	202	(4)
or United States History	HST	202	(4)
Life Science	BIO	110	(3)
Principles of Economics	EC	201	(4)
Freshman Composition	ENG	104	(4)
Freshman Comp	ENG	105	(4)
or Report Wrtg	COM	216	(4)
Inter Comp Syst	CIS	110	(4)
College Algebra	MAT	105	(4)
Bus & Prof Ethics	PHL	205	(4)
Adv & Arguments	SP	204	(4)
Intro to Statistics	STA	107	(4)
or Elem Statistics	STA	120	(4)
Foreign Language Proficiency or Equivalent Proficiency in English (equivalent to three quarters of study)			(12)
Add'l General Education units			(28)
Electives			(14)

* Students with foreign language competency should take 8 units of Ag courses instead, plus add'l GE courses from Literature and Foreign Language

INTERNATIONAL AGRICULTURE MINOR

International Marketing of Ag Products	IA/ABM	330	(3)
Ag Cooperatives	IA/ABM	360	(3)
Ag Policy in Developing Nations	IA	362	(3)

Select 23 units from the following:

World Ag Resources	IA	101	(4)
Ag Ecology	IA	201	(4)
International Ag Organizational Structures	IA	301	(4)
Ag Market Development	IA	302	(4)
Ag Land and Project Planning	IA	303	(4)
Ag Water Resource Utilization	IA/ABM	350	(3)
Seminar in Tropical Ag	IA	371	(1–2)
Farm Management in Low Income Tropical Ag	IA	380	(3)
Field Experience in Latin America	IA	401	(3–8)
Contemporary Economic Problems of Ag	ABM	300	(3)
Ag Marketing	ABM	304	(3)
Ag Policy	ABM	313	(4)
Management Accounting	ABM	324	(4)

Course Descriptions

IA 101 World Agricultural Resources (4)

Resource base for agricultural production on various continents. Potential for increasing food supplies. Role of agriculture in economic development. 4 lectures.

IA 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

IA 201 Agricultural Ecology (4)

Ecological factors affecting agricultural production in the tropics with emphasis in Latin America including the influence and interaction of environmental factors such as climate, soil, and man on crop and animal adaptation and distribution in the tropics. 4 lectures.

IA 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

IA 301 International Agriculture Organization Structures (4)

Analysis and comparison of corporate, cooperative, philanthropic, and governmental agriculture organizations affecting international agriculture. Special emphasis will be given to organizations whose activities interface with California agricultural production. Seminar discussions—3 lectures, field trips, 1 three-hour laboratory.

IA 302 Agricultural Market Development (4)

Marketing systems for agriculture in marketing less developed economies. Analysis of marketing policies used to expand and improve food production. 4 lectures. Prerequisite: IA 101, EC 201.

IA 303 Agricultural Land and Project Planning (3)

Principles of agricultural project and planning primarily for developing nations. Involves case studies, project analysis, systems applications to total project development including soils, transportation, water, markets, and production feasibility. 3 lectures.

IA/ABM 330 International Marketing Agricultural Products (3)

Marketing of agricultural products in foreign markets. Special emphasis on selecting export markets, procedures for establishing contacts, promotion, financing, insuring, shipping tariffs, customs, regulations and other matters related to agricultural commodities. Management practices and problems of California firms with international operations. 3 lectures.

IA/ABM 350 Agricultural Water Resource Utilization (3)

Current water related issues, overview of water delivery systems in the U.S. including California. Survey of water rights, administration of irrigation districts, water pollution, water conservation, efficient water management. Overview of water supplies and problems in developing nations. Field trip required. 3 lectures.

IA/ABM 360 Agricultural Cooperatives (3)

Structure, management and organization of the Agricultural Cooperative with emphasis upon current management practice. Includes comparison of cooperative with other business forms, ideals, history, and progress of the cooperative movement; problems in establishing a new cooperative; financing and membership problems. 2 lectures, and 1 three-hour lab.

IA 362 Agricultural Policy in Developing Nations (4)

Review, analysis and discussion of relevant international government agricultural policy affecting development, trade, and food production. History, current status and projections of policy trends. 4 lectures.

IA 371 Seminar in Tropical Agriculture (1-2)

Seminar on special problems encountered in tropical agriculture. Content will vary from one offering to another. Course may be repeated up to three units of credit. 1 lecture-discussion.

IA 380 Farm Management in Low Income Tropical Agriculture (3)

The traditional farm family. Nature of farmer's resources and control. Farm records. Cost relationships. Budgeting. Types of farm management decisions and guiding principles applicable. Handling of risk and uncertainty, credit, labor, machinery. Impact of public policies on farm management. 3 lectures. Prerequisite: EC 201.

IA 382 Rural Community Development (3)

The role of agriculture in rural economic development: attitudes of the traditional farm family; the role of the agricultural extension worker in rural communities; extension methods; the allocative efficiency of traditional agriculture; investing in rural communities. 3 lectures.

IA 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

IA 401 Field Experience in Latin America (3-8)

Individualized field research experience in Latin America. Class hours variable depending on credit. Prerequisite: Advanced standing; consent of advisor and instructor, one course in International Agriculture; competence in Spanish language recommended.

IA 461, 462 Senior Project (2) (2)

Students select and complete a research project under faculty supervision typical of those they will be required to handle in their field of employment. Research findings and conclusions are presented in a formal report. Minimum of 120 hours required. Prerequisite: Senior standing. May not be taken concurrently.

IA 463 Undergraduate Seminar (2)

Oral presentation of Senior project. Discussion of trends in foreign agricultural production and marketing. 2 lectures. Prerequisite: Senior project, IA 462, completed.

IA 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ORNAMENTAL HORTICULTURE

Joel W. Carter, *Chair*

James L. Degen
Terrance Fujimoto
Kent Kurtz
Margaret S. McLaughlin
Raymond Orton
Louis Polites
George A. Price
Frederick Roth
Robert D. Traut
Marilyn Winterbourne
Tom T. Yoshikawa

Ornamental horticulture is among the largest of California's agricultural industries. The state's great population growth and resulting urbanization has increased the need for landscape plantings, parks, golf courses, and beautification of the environment. Increased environmental awareness has created a boom in the population of house plants, home gardening, and all kinds of landscape development. The result has been many new job opportunities for trained horticulturists.

The department provides degrees in two majors: ornamental horticulture and park administration. The ornamental horticulture major prepares men and women for positions in the production and marketing of horticultural products, principally nursery and floricultural crops. It provides excellent background for students desiring careers in teaching or research, especially in secondary schools where there is a shortage of certified vocational agriculture instructors. It is good preparation for entering the retail nursery or florist business, and the field of landscaping, contracting and maintenance.

The 1200-acre campus is not only a showplace but provides an unusually fine collection of plant materials and becomes the laboratory for many classes. The production unit of the department boasts one of the largest and most complete facilities in the world that is available to the undergraduate. This unit includes almost 20,000 square feet of greenhouse space and over 15,000 square feet of shade houses. There are 18,000 items of container stock and over 6 acres is devoted to field grown stock flowers and the turf nursery. A large part of this facility has been constructed or developed by students working under the guidance of OH faculty.

The unit is under the direction of a technician who is assisted by a staff of approximately twenty student helpers. The staff carries on the work started by classes and operates a commercial retail and wholesale nursery. In addition, there is a retail florist shop completely operated by students. There is ample opportunity for the serious minded, dedicated student to participate in the rare "learn-by-doing" experience.

All programs allow for a wide selection of directed electives so that students will be prepared to meet the demands of their chosen field.

Opportunities for leadership development are provided by student participation in the many activities connected with construction of the Rose Parade Float, Poly Vue, and with the annual Field Day. The departmental clubs are quite active and offer additional opportunities for students to become involved with a wide variety of events and community service activities.

CORE COURSES FOR MAJOR

(Required of all students)

Intro to OH	OH	100	(2)
Basic Horticultural Skills	OH	131	(4)
Ret. Nursery Mgmt	OH	224	(4)
or Whole, Nursery Mgmt	OH	225	
Plant Materials I—Trees	OH	231	(4)
Plant Materials II—Shrubs and Vines	OH	232	(4)
Plant Materials III—Herbaceous	OH	233	(4)
Greenhouse Management	OH	323	(4)
Sub-Trop Plant Materials	OH	335	
or Native Plant Materials	OH	336	(3)
Specialized Plant Propagation	OH	422	(4)
Diseases of Ornamental Plants	OH	427	(4)
Landscape Management	OH	443	(4)
or Commercial Cut Flower	OH	435	
or Foliage Plant Prod	OH	436	
Senior Project	OH	461	(2)
Senior Project	OH	462	(2)
Senior Seminar	OH	463	(2)
Landscape Drafting Fundamentals	PA	211	(4)
Arboriculture	PA	328	(3)
Turf Management	PA	333	(4)
Basic Soil Science	SS	231	(4)
Soil Fert. & Fertilizers	SS	233	(4)
Soil Materials	SS	439	(3)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Intro to AG Business	ABM	101	(4)
or Advertising and Promotion of AG Products	ABM	225	(3)
Introduction to Arthropods	AGB	165	(4)
American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Basic Biology	BIO	115	(5)
Plant Structure and Function	BOT	124	(5)
General Plant Pathology	BOT	323	(4)
Plant Physiology	BOT	422	(5)
College Chemistry	CHM	104	(3)
College Chemistry	CHM	105	(3)
College Chemistry Lab	CHM	141	(1)
College Chemistry Lab	CHM	142	(1)
Principles of Economics	EC	201	(4)
Freshman Composition	ENG	104	(4)
Freshman Composition	ENG	105	(4)
or Report Writing	COM	216	
or Technical Writing	COM	219	
College Algebra	MAT	105	(4)
Legal Environment of Business-Transactions	FRL	201	(4)
General Psychology	PSY	201	(4)
Advocacy and Argument	SP	204	(4)

Art (Category III,A) ..... (4)
Philosophy (Category III, B) ..... (4)
Literature (Category III, C) ..... (4)
Social Science (Category IV, B) ..... (4)
Social Science (Category IV, C) ..... (4)
Free Electives ..... (16-17)
Directed Electives ..... (26)

COURSE DESCRIPTIONS

OH 100 Introduction to Ornamental Horticulture (2) FWSp

An introduction to the Ornamental Horticulture and Park Administration majors with emphasis on career opportunities in each field, curriculum choices and planning for the student, procedures in departmental and University operations. 2 lectures. Required for all OH and PA majors. Must be taken within three quarters from entrance to either major.

OH 120 House Plants (2) FWS

A study of house plants. Their identification, culture, and care. Factors for selecting plants for use in interior landscaping. Not open to OH or PA majors. 2 lectures.

OH 131 Basic Horticultural Skills (4) FWSp

The basic skills of horticulture. Techniques and plans for their use in the gardening and nursery trade. 3 lectures, 1 three-hour laboratory.

OH 200 Special Problems for Lower Division Students (1-2) FWSp

Individual or group investigations, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

OH 213 Small Property Development (4) Sp

The arrangement and relationships of various elements common to the residential garden. The effective use of ornamental plant materials. 1 three-hour lecture and 1 three-hour laboratory. Prerequisites: PA 211, OH 231, OH 232, or instructor's consent.

OH 223 Basic Floral Design (3) FWSp

Introduction to basic floral design, covering preparation of flowers, color harmony, and design principles. 1 lecture. 2 three-hour laboratories.

OH 224 Retail Nursery Management (4) FSp

Legal aspects and economics of operating a commercial retail nursery. Federal, state and local regulations. Site selection; layout of shop and sales yard; purchase supplies; inventory control; sales and service; advertising related to operating a retail nursery business. 3 lectures, 1 three-hour laboratory. Prerequisite: OH 131.

OH 225 Wholesale Nursery Management (4) W

Wholesale nursery management, propagation, transplanting, potting, canning, shifting of nursery stocks. Proper soil mix, fertilizer, insecticides, and fungicides used in nursery management. Quality and inventory control, shipping practices, credit management. Automation, mechanization and other labor saving equipment available. 3 lectures, 1 three-hour laboratory. Prerequisite: OH 131.

OH 230 House Plants (3) W

An intensive study of house plants or those plants suitable for interior landscaping as in shopping malls. Their identification, culture and care. Factors for selecting plants for use in interior landscaping. 2 lectures and 1 three-hour laboratory. Prerequisite: OH 131.

OH 231 Plant Materials I—Trees (4) F

A study of trees commonly used in the southern California landscape. Approximately 200 trees will be identified and described according to growth habit, cultural requirements, and use in the landscape. 3 lectures and 1 three-hour field laboratory. Prerequisite: BIO 115 or permission of instructor.

OH 232 Plant Materials II—Shrubs and Vines (4) W

A study of woody shrubs and vines commonly used in the southern California landscape. Approximately 200 plants will be identified and described according to growth habit, cultural requirements, and use in the landscape. 3 lectures and 1 three-hour field laboratory. Prerequisite: BIO 115 or permission of instructor.

OH 233 Plant Materials III—Herbaceous (4) Sp

A study of herbaceous plants—bedding plants, groundcovers, and non-woody vines comonly used in the southern California landscape. Approximately 200 plants will be identified and described according to growth habit, cultural requirements, and use in the landscape. 3 lectures and 1 three-hour field laboratory. Prerequisite: BIO 115 or permission of instructor.

OH 253 Home Horticulture (4) W

Solving home environmental problems. The planning and installation, maintenance and management of the garden, lawns, and ground-covers. Emphasis on how plants are propagated, selected, and cared for in a successfully landscaped area. For majors other than Ornamental Horticulture and Park Administration. 3 lectures, 1 hour recitation.

OH 299 Special Topics for Lower Division Students (1–4) FWSp

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

OH 323 Greenhouse Management (4) FW

Design and management of different types of greenhouses and plant shelters. Maintenance, heating, cooling, humidification systems and their controls. Mechanization, automatic and semi-automatic fertilization and watering systems. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 115 or BOT 124.

OH 335 Sub-Tropical Plant Materials (3) FSp

Sub-tropical plant materials, including ferns, bamboos, palms, house plants. Identification, growth habits, cultural requirements and landscape use. 2 lectures, 1 three-hour laboratory.

OH 336 Native Plant Materials (3) Sp

Native California plants suitable for landscape purposes. Their identification, habits of growth, cultural requirements, and landscape use. 2 lectures, 1 three-hour laboratory.

OH 400 Special Problems for Upper Division Students (1–2) FWSp

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

OH 422 Specialized Plant Propagation (4) FW

Current topics in plant propagation concerning juvenility, growth regulators, scion/rootstock combinations, tissue culturing, and disease management. Emphasis on commercial propagation by cuttings, grafting/budding, tissue culturing, division, layering, and seeding. 3 lectures, 1 three-hour laboratory. Prerequisite: BOT 422.

OH 427 Diseases of Ornamental Plants (4) FSp

Diagnosis and control of biotic and abiotic diseases and selected insect problems on ornamental plants in interior and exterior landscapes, and under various production conditions. Labs include field trips to production areas. 3 lectures, 1 three-hour laboratory. Prerequisite: BOT 323.

OH 435 Commercial Cut Flower Production (4) FW

Controlling production of potted and cut flowers by using photoperiod, temperature adjustment, vernalization and chemicals to schedule maturity of a crop. Automated water, shading and fertilization systems. Disease and pest control. 3 lectures, 1 three-hour laboratory. Prerequisites: OH 131, 323, SS 231, 233, and BOT 124.

OH 436 Foliage Plant Production (4) Sp

The detailed study of production, propagation and marketing of foliage plants. Systems for producing, and methods to manipulate the environment are studied. 3 lectures, 1 three-hour laboratory. Prerequisites: OH 323.

OH 437 Diagnosis of Ornamental Plant Growth Problems (3) W

The use of laboratory and field techniques for the diagnosis of biotic and abiotic diseases and certain insect pests on ornamental plants in the landscape and under various production conditions. Students will diagnose actual problems presented as unknowns. Prerequisite: OH 427 and SS 231 or consent of instructor.

OH 443 Landscape Management (4) FWSp

The selection and techniques necessary for the proper management of ornamental plants. 3 lectures, 1 three-hour laboratory.

OH 461, 462 Senior Project (2) (2) FWSp

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours of total time.

OH 463 Undergraduate Seminar (2) WSp

An open forum of senior students in which the latest developments, practices, and procedures are discussed. Each student is responsible for the development and presentation of a topic in his/her chosen field. 2 lectures.

OH 499 Special Topics for Upper Division Students (1–4)

Grouped study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

PARK ADMINISTRATION

One of the two majors offered in the ornamental horticulture department is park administration. For the other program in this department, see ornamental horticulture.

Joel Carter, *Chair*

Kent Kurtz Raymond Orton George A. Price

The park administration major in the ornamental horticulture department provides opportunities to obtain the skills and knowledge needed for top management positions in park systems. A thorough foundation in ornamental horticulture is complemented with courses in recreation, administration and management, parks systems and design, and public relations.

Although graduates may begin their careers as park rangers, supervisors, or assistants, the curriculum establishes the educational foundations necessary for advancement to higher level positions such as superintendent, director, or general manager in the larger parks and recreation systems. Careers in the field of park administration are open to all qualified persons and job opportunities are abundant. The program places emphasis on the organization and operation of city parks but considerable time is spent in the study of regional, state, national and commercial parks. The student may prepare for a career in landscape contracting, natural resource management, or golf course management by taking approved courses in the concentrations and by participating in selected work experience programs.

Field trips are taken to many types of parks and recreation facilities in Southern California. Students are encouraged and assisted in obtaining part-time and summer employment with parks agencies, golf courses, landscape contractors, and the university grounds department. Internships are arranged to help students gain experience to supplement their professional education.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to OH	OH	100	(2)
Basic Horticultural Skills	OH	131	(4)
Plant Materials I—Trees	OH	231	(4)
Plant Materials II—Shrubs and Vines	OH	232	(4)
Plant Materials III—Herbaceous	OH	233	(4)
Native Plant Materials	OH	336	(3)
or Landscape Management	OH	443	(4)
Landscape Drafting Fundamentals	PA	211	(4)
Site Development	PA	212	(4)
Park and Recreation Planning	PA	213	(4)
Orientation and History of Parks	PA	214	(3)
Recreation Concepts	PA	219	(3)
Aquatic Facility Management	PA	325	(4)
Diseases and Pests of Park Plants	PA	327	(4)
Arboriculture	PA	328	(3)
Turf Management	PA	333	(4)
Landscape Contracting	PA	415	(3)
Landsc. Spec. & Est.	PA	416	(4)
Park Facility Management	PA	425	(4)
Park Policies and Procedures	PA	426	(4)
Park Budgets and Finance	PA	427	(3)
Golf Course Management	PA	436	(4)
Senior Project	PA	461	(2)
Senior Project	PA	462	(2)
Undergraduate Seminar	PA	463	(2)

SUPPORT AND ELECTIVE COURSES

(Required of all Students)

Management Accounting	ABM	324	(4)
Personnel Management	ABM	402	(3)
Introduction to Arthopods	AGB	165	(4)
Construction Fundamentals	AE	121	(2)
Utility Systems	AE	122	(2)
Surveying Fundamentals	AE	131	(2)
Automatic Irrigation Systems	AE	321	(4)
American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Basic Biology	BIO	115	(5)
Plant Structures and Functions	BOT	124	(5)
Fundamentals of Chemistry	CHM	104	(3)
College Chemistry Lab	CHM	141	(1)
Freshman Composition	ENG	104	(4)
Freshman Composition	ENG	105	(4)
or Report Writing	COM	216	
or Technical Writing	COM	219	
Business Law	FRL	312	(4)
College Algebra	MAT	105	(4)
General Psychology	PSY	201	(4)
Outdoor Recreation	REC	318	(4)
Advocacy and Argument	SP	204	(4)
Basic Soil Science	SS	231	(4)
Soil Fertility and Fertilizers	SS	233	(4)
Art (Category III, A)			(4)
Philosophy (Category III, B)			(4)
Literature (Category III, C)			(4)
Social Science (Category IV, A)			(4)
Social Science (Category IV, C)			(4)
Technical Electives			(6)
Electives			(10–11)

Course Descriptions

PA 200 Special Problems for Lower Division Students (1–2) FWS

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PA 211 Landscape Drafting Fundamentals (4) F

The fundamentals of drafting and graphic presentation. Methods and procedures for preparation of the landscape structural components. 1 three-hour lecture, and 1 three-hour lab.

PA 212 Site Development (4) W

A survey of landscape construction materials: principles of grading and drainage; analysis of simple landscape design and structural components. 1 three-hour lecture, and 1 three-hour lab. Prerequisite: PA 211, or equivalent.

PA 213 Park and Recreation Planning (4) Sp

Park and recreation area and facility analysis. Determining need, carrying capacity, design criteria and optimum layout. 3 lectures, 1 three-hour laboratory. Prerequisite: PA 212, or permission of instructor.

PA 214 History of Gardens and Parks (4) FWS

The relationship of humankind to the flora of their natural and planted environment through the ages. Landscaping styles and their social significance. The evolution of scenic resources preservation concepts. The patterns of man's sports, amusements and recreation, particularly as they relate to parks and grounds. 4 lectures.

PA 219 Recreation Concepts (3) W

Past and present concepts of recreation. Their effect on the park administrator in dealing with such problems as land acquisition, park design, and use of parks and park facilities. 3 lectures.

PA 299 Special Topics for Lower Division Students (1–4) FWSp

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

PA 325 Aquatic Facility Management (4) Sp

Management of all types of water related recreation facilities including fountains, reflecting pools, wading pools, swimming pools, lakes and ponds, beaches and marinas. The supervision and organization of aquatic recreation activities such as wading, swimming, boating, surfing and fishing. 3 lectures. 1 three-hour laboratory.

PA 327 Diseases and Pests of Park Plants (4) F

The effect of diseases and pests on ornamental plants found in parks, parkways, golf courses and institutional grounds; their identification, control, and prevention. Field trips to parks to study field conditions, 3 lectures, 1 laboratory.

PA 328 Arboriculture (3) FW

Care and management of specimen ornamental trees. Cavity repair, bracing and cabling, pruning. Practice in the use of lines and in climbing. Safety practices. 2 lectures, 1 three-hour laboratory. Prerequisite: OH 131, 231.

PA 332 Athletic Turfgrass Management (3) FSp

The grasses, materials and techniques involved in the maintenance and management of all types of athletic and recreational fields. 3 lectures. Prerequisite: Junior standing or consent of instructor. For non-majors.

PA 333 Turf Management (4) FWSp

Consideration in the management of turf, including such specialized areas as golf courses, bowling greens, athletic fields and park lawns. 3 lectures, 1 three-hour laboratory. Prerequisite: Junior standing or consent of instructor and SS 221 or 231.

PA 400 Special Problems for Upper Division Students (1–2) FWSp

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PA 415 Landscape Contracting (3) FSp

Management of landscape contracting firms. Bonding, insurance, contracts, ownership, licensing and other legal aspects of improvement to real property. Orientation to the landscaping industry. 3 lectures. Prerequisite: senior standing or permission of the instructor.

PA 416 Landscape, Specifications and Estimating (4) W

Calculation of costs, manpower, and quantities of materials in landscape development. Preparation of specifications and estimates used in bidding. 3 lectures, 1 three-hour laboratory. Prerequisite: PA 415.

PA 425 Park Facilities Management (4) FSp

Management of facilities normally within the jurisdiction of the park department, including, but not limited to, the management of park structures, play equipment, surfaced areas, and sanitary facilities. 3 lectures, 1 three-hour laboratory.

PA 426 Park Policies and Procedures (4) W

Policies and procedures governing park departments, including but not limited to, public relations, relationship to other governmental agencies. Analysis of park problems, planning, and scheduling. Emphasis on the municipal level. 3 lectures, 1 three-hour laboratory.

PA 427 Budgeting and Finance of Parks (3) Sp

The administration of public funds by park departments for acquisition, development, and operation of park areas. A study of tax structures, bonds, purchasing, and budgeting techniques. 3 lectures. Prerequisite: PA 426.

PA 436 Golf Course Management (4) W

The management, supervision, maintenance and operation of golf courses. A study of the equipment, scheduling, promotion and personnel required and related facilities of public and private courses. 3 lectures, 1 three-hour laboratory. Prerequisites: PA 333.

PA 437 Advanced Turfgrass Science and Culture (3) F

Study of the management and cultural practices and their role in the production and development of closely clipped grasses. Responses of the grass plant to environmental factors as temperature, light, water, soil, and air pollution. Prerequisites: PA 333, SS 231, 233.

PA 441 Internship in Park Administration (1-6) FWSpSu

On-the-job experience with public and private agencies for advanced students. Professional type experience new to the student so a valuable contribution toward career development results. One unit credit for each certified 100 hours of experience. Written reports necessary. Approval required before enrolling. Prerequisite: Junior standing. May be repeated for a maximum of six units.

PA 461, 462 Senior Project (2) (2) FWSpSu

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report.

PA 463 Undergraduate Seminar (2) Sp

An open forum of senior students in which the latest developments, practices and procedures are discussed. Selected field trips.

PA 499 Special Topics for Upper Division Students (1-4) FWSpSu

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

SOIL SCIENCE

One of the four majors offered in the plant and soil science department is soil science. For other programs in this department see agricultural biology, agronomy, and fruit industries.

Robert J. Tullock, *Chair, Plant and Soil Science Department*

James A. Pomerening, *Coordinator*

Gaylord P. Patten George W. Schmitz

The soil science major is for those who desire to become guardians of the soil. Soil is one of the natural resources which is basic for life and human existence. As the natural medium for plant growth, it is the source of most of our food and clothing. It provides shelter in the form of bricks and timber products. Mankind also depends upon the soil as a material for supporting and locating buildings, transportation systems, waste disposal sites, outdoor recreational playgrounds, flood control ditches, and underground uitility systems.

There are thousands of kinds of soil on earth; each having a unique set of characteristics. Soil science students learn how to determine these characteristics in both the field and laboratory. They learn to relate these characteristics to the genetic history of the soil and to organize and classify this information in a systematic manner. They also learn to determine the location and extent of soils in the field and to show this on a soil map.

The characteristics of a soil determine the degree of suitability for a variety of alternative uses, and the appropriate management practices required to keep the soil permanently productive. Soil quality can be altered by the activities of mankind. If abused, soil productivity declines. If treated properly, a soil will produce indefinitely. Soil scientists prevent soil deterioration while striving to maintain or improve soil productivity for all future generations.

The demand for soil scientists is keeping pace with the human population growth curve and the growing awareness for maintaining a clean and aesthetic environment. A career in soil science is an alternative for anyone who is concerned about the conservation of natural resources and the future wealth of mankind, and has a strong interest in the biological and physical sciences.

The Cal Poly, Pomona, soil science program enjoys an excellent local, state, and national reputation. This reputation results from a strong curriculum, taught by a well-qualified faculty, supported by outstanding laboratory and field facilities which has produced alumni who are professional soil scientists.

Soil scientists have many options for career opportunities. They can work for private industry or governmental agencies; in the laboratory, field, office or classroom; and in either urban or rural areas. They can apply their knowledge to the production of agronomic, horticultural, rangeland, or forestry plants; to the use of soils for urban planning and development; to the manufacturing and marketing of fertilizers and other agricultural materials; or to the administration of natural resource programs. Many graduates pursue advanced training and work in research and education.

About half of the Cal Poly soil science graduates are employed by a governmental agency. At the federal level they are working for the Bureau of Land Management, Forest Service, Soil Conservation Service, or Scientific and Educational Administration. Several foreign students are employed by their native country's Department of Agriculture. At the state level in California and elsewhere, they are employed by a State University, Department of Forestry, Department of Water Resources, or Department of Health Services. At the county or local level, they are working for the Agricultural Commissioner's Office, the Agricultural Extension Office, or the County Arboretum. One alumnus is with the Food and Agricultural Organization of the United Nations.

The soil science graduates with private industry are mainly employed by agricultural chemical companies, soil engineering testing and consulting firms, wholesale horticultural nurseries, food production and processing companies, agricultural management consulting firms, or soil testing laboratories.

The soil science *minor* is primarily for students majoring in another discipline which is dependent upon soil science. It is a valuable curricular adjunct for those majors stressing plant growth, such as: agronomy, botany, fruit industries, landscape architecture, and ornamental horticulture. The soil science minor will also strengthen the academic background of those majoring in agricultural engineering, civil engineering, agricultural science, anthropology, biology, geology, geography, international agriculture, and urban planning.

CORE COURSES FOR MAJOR

(Required of all students)

Landscape Surveying	AE	232	(3)
Irrigation	AE	240	(4)
Basic Soil Science	SS	231	(4)
Soil Management	SS	232	(4)
Soil Fertility and Fertilizers	SS	233	(4)
Soil and Water Conservation	SS	333	(4)
Soil & Plant Analysis	SS	339	(3)
Soil Taxonomy	SS	342	(3)
Soil Microbiology	SS	343	(3)
Soil Chemistry	SS	431	(4)
Soil Physics	SS	432	(5)
Soil Morphology and Survey	SS	433	(4)
Senior Project	SS	461	(2)
Senior Project	SS	462	(2)
Undergraduate Seminar	SS	463	(2)
Crop Production Courses (see Advisor)			(8)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Management Accounting	ABM	324	(4)
Introduction to Arthropods	AGB	165	(4)
Weeds and Weed Control	AGR	233	(4)
or			
Range Management	AGR	336	
American Civilization	AMC	201	(4)
or			

Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or			
US History	HST	202	
Animal Agricultural Science	AS	111	(3)
Basic Biology	BIO	115	(5)
Plant Structures and Functions	BOT	124	(5)
General Plant Pathology	BOT	323	(4)
Plant Physiology	BOT	422	(5)
College Chemistry	CHM	104	(3)
College Chemistry	CHM	105	(3)
College Chemistry	CHM	106	(3)
College Chemistry Lab	CHM	141	(1)
College Chemistry Lab	CHM	142	(1)
College Chemistry Lab	CHM	143	(1)
Elements of Organic Chemistry	CHM	201	(3)
Quantitative Analysis	CHM	221	(4)
Organic Chemistry Lab	CHM	250	(1)
Freshman Composition	ENG	104	(4)
Freshman Composition	ENG	105	(4)
or			
Report Writing	COM	216	
Principles of Geology	ESC	111	(5)
Trigonometry	MAT	106	(4)
College Algebra	MAT	105	(4)
Basic Microbiology	MIC	201	(5)
College Physics	PHY	121	(3)
College Physics	PHY	122	(3)
College Physics Lab	PHY	141	(1)
College Physics Lab	PHY	142	(1)
Advocacy and Argument	SP	204	(4)
Art, Literature & Philosophy			(12)
Social, Political or Economic Institutions			(8)
The Integrated Being			(4)
Electives			(15)

SOIL SCIENCE MINOR

Minimum Units—20
Minimum Upper Division Units—9

Required Courses (all students)

Basic Soil Science	SS	231	(4)
Soil Fertility and Fertilizers	SS	233	(4)

Select 12 units from the following:

Soil Management	SS	232	(4)
Soil and Water Conservation	SS	333	(4)
Soil and Plant Analysis	SS	339	(3)
Soil Taxonomy	SS	342	(3)
Soil Microbiology	SS	343	(3)
Soil Chemistry	SS	431	(4)
Soil Physics	SS	432	(5)
Soil Morphology and Survey	SS	433	(4)
Soil Materials	SS	439	(3)

Course Descriptions

F, W, Sp, and Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified the course is offered each year during the indicated quarter(s). When appropriate, the names of faculty associated with each course are specified; otherwise, "Staff" is noted.

SS 200 Special Problems for Lower Division Students (1–2) FWSp

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff*

SS 231 Basic Soil Science (4) FWSp

Basic concepts and scientific methodologies of the living and non-living systems of soils; integrated relationships between soils and climate, plants, animals, geologic materials, land form and time; and the impact of soils on civilization. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 104, 141. *Patten, Pomerening, Tullock*

SS 232 Soil Management (4) WSp

Critical evaluation of the technical methods and materials for managing soils for multiple uses and sustained yields while preserving environmental quality as influenced by past and present social, political, and economic institutions in western and non-western societies. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 231. *Pomerening*

SS 233 Soil Fertility and Fertilizers (4) FWSp

Critical evaluation of concepts, methods and materials for improving the fertility of soils used for the sustained production of all types of commercial plants while preserving environmental quality as influenced by past and present social, political, and economic institutions in Western and non-western societies. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 231. *Schmitz*

SS 299 Special Topics for Lower Division Students (1–4) FWSp

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both. *Staff*

SS 333 Soil and Water Conservation (4) F

Critical examination and evaluation of the principles and integrated effects of soil, climate, topography and land use systems on losses of soil and water. Social political and economic impact of erosion and conservation. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 231. Patten

SS 339 Soil and Plant Analysis (3) FW

Critical evaluation of the basic concepts and scientific methodologies for analyzing the nutrient status of soils and plant tissue as a means for diagnosing alternative fertilizer and amendment treatments as influenced by past

and present social, political, and economic institutions in western and non-western societies. 2 lectures, 1 three-hour laboratory. Prerequisites: CHM 105, 142; SS 231. *Tullock*

SS 342 Soil Taxonomy (3) W

Critical evaluation of the basic concepts and scientific methodologies for the classification of soils into comprehensive, integrated systems as influenced by past and present social, political, and economic institutions in western and non-western societies. 3 lectures. Prerequisite: SS 231. *Pomerening*

SS 343 Soil Microbiology (3) Sp

Critical evaluation of the basic concepts and scientific methodologies regarding the interactions between the integrated soil-plant-microbial system and their effects on soil productivity and environmental quality as influenced by past and present social, political, and economic institutions in western and non-western societies. 2 lectures 1 three-hour laboratory. Prerequisites: SS 231; MIC 201; CHM 201. *Staff*

SS 400 Special Problems for Upper Division Students (1–2) FWSp

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff*

SS 431 Soil Chemistry (4) Sp

Critical evaluation of the basic concepts and scientific methodologies regarding the chemical composition and reactions of the integrated solid-liquid-gaseous system in soils and their relationship to soil productivity and environmental quality as influenced by past and present social, political, and economic institutions in western and non-western societies. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 339; CHM 221; or consent of instructor. *Tullock*

SS 432 Soil Physics (5) W

Critical examination and evaluation of the universal concepts and scientific methodologies regarding the physical properties and transformations of the integrated solid-liquid-gaseous system in soils and their relationship to soil productivity, environmental quality, land utilization, and the quality of life. 3 lectures, 2 3-hour laboratories. Prerequisites: PHY 122; SS 231; or consent of instructor. Patten

SS 433 Soil Morphology and Survey (4) F

Critical evaluation of the basic concepts and scientific methodologies regarding soil morphology and its integrated relationship to the preparation of soil surveys and soil-use interpretations as influenced by past and present social, political, and economic institutions in western and non-western societies. 3 lectures, 1 three-hour laboratory. Prerequisite: SS 231; SS 342. Pomerening

SS 439 Soil Materials (3) FWSp

Critical evaluation of the materials, basic concepts, and scientific methodologies regarding the management of soils for the production of ornamental plants and other non-farm uses while preserving environmental quality as influenced by past and present social, political, and economic institutions in western and non-western societies. 2 lecturds, 1 threehour laboratory. Prerequisite: SS 231. Schmitz

SS 441, 442 Internship in Soil Science (1–4) (1–4) Su

On-the-job experience with public and private agencies for advanced students. Professional type experience new to the student so that a valuable contribution toward career development results. One unit credit for each 100 hours of experience. Written reports necessary. Prerequisite: Junior standing. *Staff*

SS 461, 462 Senior Project (2) (2) FWSp

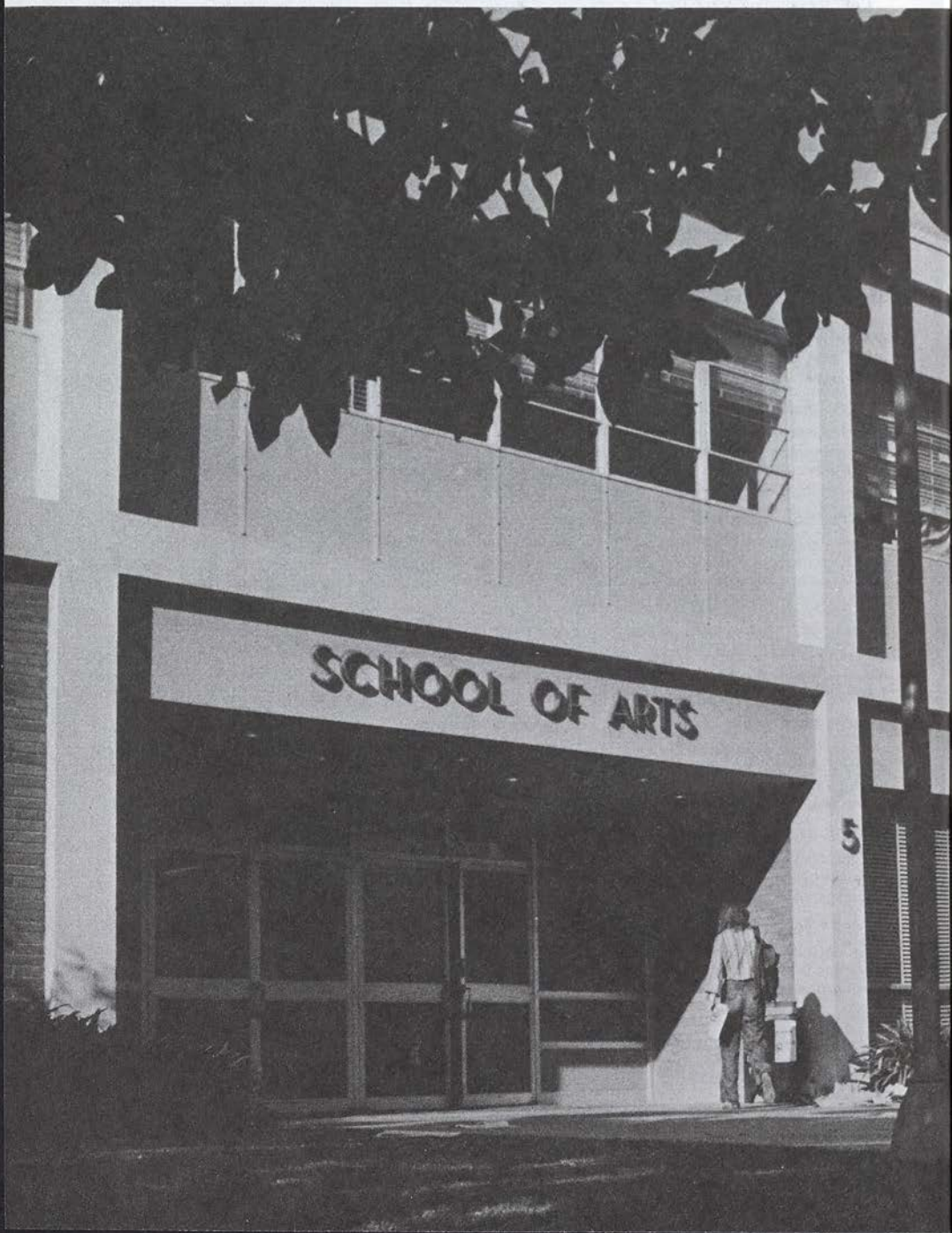
An analytical investigation of a soil science research project in an area of special interest to the individual student, working under faculty supervision, culminating in a formal rhetorical, expository report that emphasizes clarity and lucidity of thought based on deductive and inductive reasoning, and the use of graphic skills. Minimum of 120 hours. Staff

SS 463 Undergraduate Seminar (2) FSp

Critical reviews of contemporary research in the field of soil science. The student will analyze, criticize and advocate by inductive and deductive methods. Inferences in contemporary literature are based on fact or a logical, unambiguous extension of fact. Oral reports of literature and senior projects are required.

SS 499 Special Topics for Upper Division Students (1–4) FWSp

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both. *Staff*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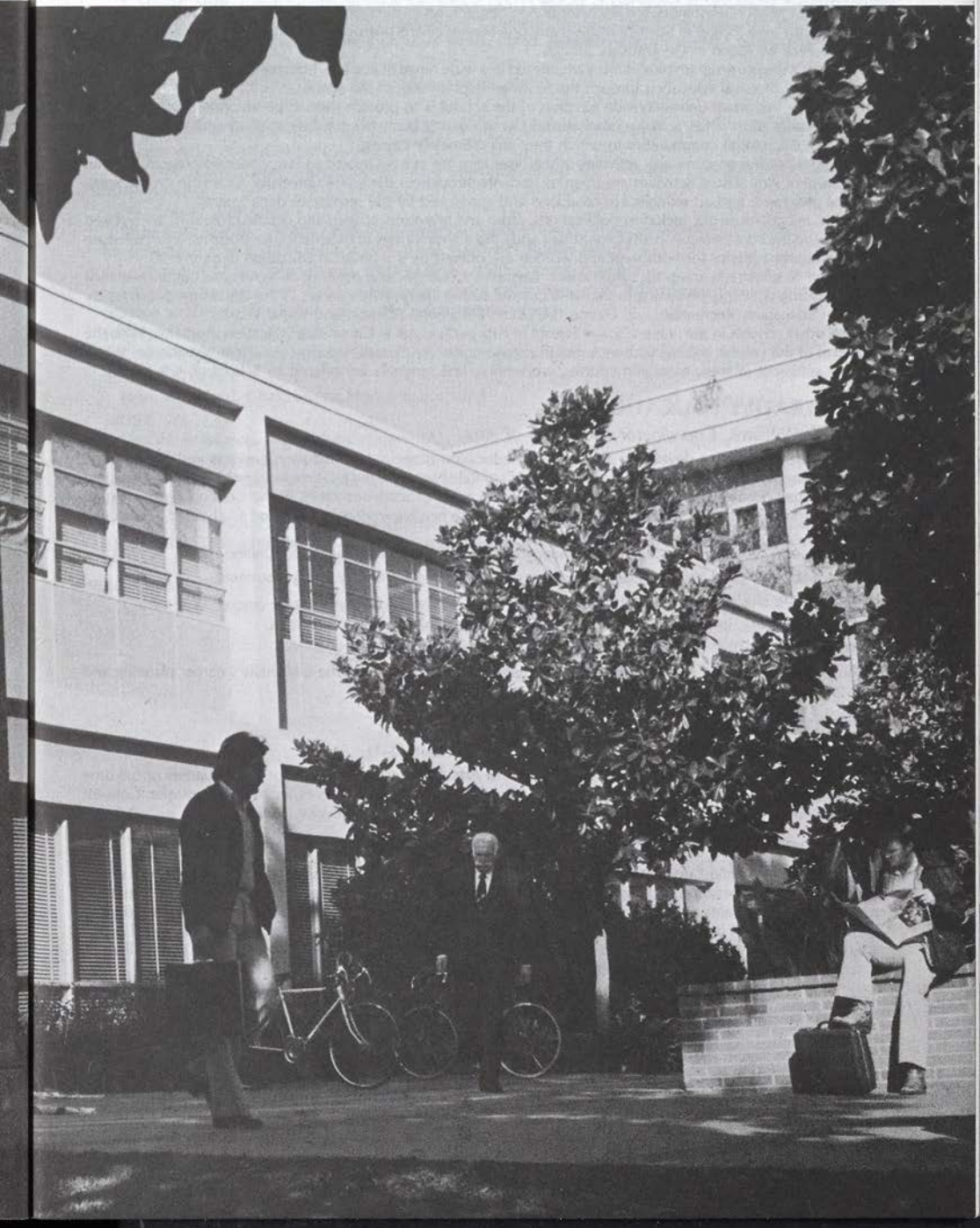


SCHOOL OF ARTS

Yolanda T. Moses, *Dean*

Robert L. Charles, *Associate Dean*

James H. Williams, *Associate Dean*

The School of Arts meets the needs of today's students by providing both a fundamental base of knowledge and instruction in the application of that learning to our complex world. In pursuit of these objectives, the School of Arts offers twenty-five minors, ten Bachelor of Arts degrees, seven Bachelor of Science degrees, four Certificates of Proficiency, two Master of Science degrees and one Master of Arts degree. Information concerning the master's curricula may be found in the graduate listings.

Bachelor's degree programs and minors are offered in a wide range of fine arts, humanities, behavioral and social sciences, and physical education through the fourteen departments of the school.

An equally important universitywide function of the school is to provide instruction in certain basic offerings in general education. Thus, a major emphasis falls on preparing graduates for their roles as active, participating citizens of the several communities to which they will ultimately belong.

A majority of the co-curricular activities of the university are closely related to the academic programs within the School of Arts. These activities are open to students throughout the entire university. Dramatic productions, musical programs, and art exhibits are produced and sponsored by the respective departments.

Communications media, including publications, radio and television, speech and debate programs, are advised by faculty in the communication arts department and offer a wide variety of experience for students. Intercollegiate and intramural athletics for both men and women are offered by the physical education department.

In order to effectively integrate handicapped persons into our society, the School of Arts has committed itself to introducing concepts pertaining to the handicapped within appropriate courses in the Departments of Health, Physical Education, Recreation, and Dance (HPERD); Behavioral Science; and Social Work.

With other schools in the university, the School of Arts participates in Continuing Education programs. With the approval of the faculty, the public may enroll in regular university classes through concurrent registration. When there is sufficient interest, extension courses, workshops, and seminars are offered by School of Arts faculty.

COOPERATIVE EDUCATION

James H. Williams, *Coordinator for School of Arts*

The School of Arts has developed a cooperative education program with industry, business and government. This program is designed to provide alternating periods of full-time study and full-time work or to combine part-time study and part-time work. A student may earn up to 16 units of academic credit in the Cooperative Education program. The student's job performance is evaluated by both her/his work supervisor and a School of Arts faculty member.

The Cooperative Education program provides interested students with four opportunities:

1. To have "real world responsibility and experience" in business, industry and government.
2. To evaluate alternate career opportunities.
3. To earn a salary, in some situations, which will help them pay for their education.
4. To have prospective employers become acquainted with co-op students.

More information may be obtained from the Dean of Arts' office and/or the University's career planning and placement center.

COOPERATIVE EDUCATION COURSES

SA 470, 471, 472, 473 Cooperative Education (2–4) (2–4) (2–4) (2–4)

On-the-job experience for all majors in the School of Arts. Students alternate one or more quarters of full-time studies in their major with an equal number of quarters of relevant full-time work for pay. Prerequisite: Consent of instructor and junior standing. (Courses must be taken in ascending sequence.)

CERTIFICATE IN GERONTOLOGY

A multi-departmental Certificate Program in Gerontology is offered under the sposorship of the Dean of the School of Arts. The program is designed to provide broad acquaintance with the process of aging from a number of perspectives. Students preparing for employment or graduate study, as well as those seeking further insight into their own aging, can benefit from this program. A 32-unit sequence of courses is required for the award of the Certificate. Additional information can be gained from the Cal Poly Gerontology Coordinator, Dr. William R. Larson, Department of Behavioral Science.

Departments and Majors/Minors

ART
Joe Hannibal, *Chair,* Art major (BA), Art History minor

BEHAVIORAL SCIENCES
Gary A. Cretser, *Chair,* Behavioral Sciences major (BA); Options in Applied Social Psychology/Sociology, Behavioral Science, Counseling and Human Services, Experimental and Clinical Psychology, Sociology; Criminal Justice and Corrections minor

COMMUNICATION ARTS
T. Harrell Allen, *Chair,* Communication Arts major (BS); Options in Electronic Broadcasting, Newspaper and Magazine Journalism, Public Relations, Specialized Communications, Speech, organizational communications; Communications minor, Newspaper Journalism minor, Public Relations minor, Speech Communication minor

DRAMA
Robert L. Gilbert, *Chair,* Drama major (BA), Drama minor

ECONOMICS
John T. Shieh, *Chair,* Economics major (BS); Master of Science in Economics, Economics minor

ENGLISH AND FOREIGN LANGUAGES
Harold P. Levitt, *Chair,* English major (BA), Humanities major (BA), Master of Arts in English, English minor, Spanish minor

ETHNIC AND WOMEN'S STUDIES
Richard A. Santillan, *Acting Chair,* Afro-American Studies minor, American Indian Studies minor, Asian-Paciic Studies minor, Chicano-Hispanic Studies minor, Women's Studies minor

HEALTH, PHYSICAL EDUCATION, RECREATION, AND DANCE (HPERD)
Stanley L. Bassin, *Chair,* Physical Education major (BS); Recreation Administration major (BS); Master of Science in Physical Education; Recreation Administration minor

HISTORY
David R. Smith, *Chair,* History major (BA), History minor, Latin American Studies minor

LIBERAL STUDIES
John T. Hatfield, *Chair,* Liberal Studies major (BA)

MUSIC
Donald Ambroson, *Chair,* Music major (BA), Music minor

POLITICAL SCIENCE
Bruce Grube, *Chair,* Political Science major (BA); Political Science minor, Public Administration minor

SOCIAL SCIENCES
Walter P. Coombs, *Chair,* Social Sciences major (BS); Philosophy major (BA); Anthropology/Geography major (BS); American Studies major (BA); American Studies minor, Anthropology minor, Geography minor, Philosophy minor

SOCIAL WORK
Consuelo G. Lopez, *Acting Chair,* Social Work major (BS)

AMERICAN STUDIES

One of the four majors offered in the social sciences department is American studies. For other programs in the department see anthropology/geography, philosophy, and social sciences.

Walter P. Coombs, *Chair,* Social Sciences Department

Richard S. Hyslop, *Coordinator*

Judith Anderson Richard L. Johnson Sheila G. Manes

John A. Moore

The rich diversity of American culture provides the central focus for American Studies. The American Studies curriculum has been designed with careful concern for flexibility, offering the student a wide variety of choices. Those who wish a broad, interdisciplinary study linking American society, institutions, politics, and culture will especially appreciate this major. It is a program which introduces students to scholars trained in the arts, humanities, engineering, technology as well as the social sciences.

In particular, the major is directed toward producing an expert in the field of American culture. The basic core required of all students in the major provides a firm ground in the assumptions, structures, and rationale of the American experience. Individual students, in consultation with their advisors, are encouraged to create a complementary focus of a minor appropriate for interest and career goals. The combination of the coordinated American culture studies and the specific minor prepares students for a wide variety of career options. There is increasing demand for this background in government and industry.

Typical professional goals include positions with various governmental agencies at federal, state, and local levels. The major provides valuable training careers in law, teaching, media, and business. Specifically, the marketable skill of the American Studies major is his or her understanding of the historical and cultural rationale for American values and decision-making processes here and abroad. Thus the major provides strong training for all careers which depend upon a competent and sophisticated knowledge of the American experience. Logical employment areas include merchandising, marketing, advertising, management, sales, service, and hospitality industries.

Finally, the major permits maximum flexibility for students who desire to pursue their studies beyond the bachelor's degree in graduate programs such as American studies, law, literature, history and other related areas.

Admission to the program is open to all qualified and interested students admitted to the University. Each student is required to fulfill the basic core course listings, and will choose the specific courses in consultation with his/her advisor.

CORE COURSES FOR MAJOR

(Required of all students)

American Studies in Perspective	AMS	301	(4)
American Ideologies	AMS	345	(4)
American Studies in Theory and Practice	AMS	401	(4)
Senior Seminar	AMS	463	(4)
Indians of N. Amer	ANT	321	(4)
or Hist of Amer Indian	HST	337	
Survey of Am Lit	ENG	211	(4)
Survey of Am Lit	ENG	212	(4)
U.S. & Canada Geography	GEO	350	(4)
Black Man in Amer	HST	210	(4)
or Black Man in Amer	HST	211	
The Amer Southwest in the 20th Century	HST	435	(4)
Amer Philosophy	PHL	320	(4)
or Am Polit Thought	PLS	433	
Foreign Relations of the U.S.	PLS	455	(4)
or Polit Parties	PLS	324	
or Constit Law	PLS	401	
Additional courses selected in consultation with advisor			(16)

SUPPORT AND DIRECTED ELECTIVES

(Required of all students)

Amer Civiliz	AMC	201	(4)
or Intro to American Government	PLS	201	
Amer Civiliz	AMC	202	(4)
or U.S. History	HST	202	
Varieties of American Culture	AMS	333	(4)
Amer Dreams, Myths and Realities	AMS	450	(4)
Hist of Art of the U.S.	ART	215	(4)
Freshman Comp	ENG	104	(4)
Freshman Comp	ENG	105	(4)
American Renaissance	ENG	452	(4)
or American Realism	ENG	454	
or 20th Century American Lit	ENG	456	
U.S. History	HST	201	(4)
Diplomatic Hist of the U.S.	HST	340	(4)
Advocacy and Argument	SP	204	(4)
Courses to complete Gen. Ed. requirements			(44)
Unrestricted electives			(34)

AMERICAN STUDIES MINOR

This minor may be taken by Social Science majors.

The student must select 12 units from the following:

American Studies in Perspective	AMS	301	(4)
Varieties of American Culture	AMS	333	(4)
American Ideologies	AMS	345	(4)
American Studies in Theory and Practice	AMS	401	(4)
American Dreams, Myths and Realities	AMS	450	(4)

The student must select 20 units from the following: (20)

Indians of North America	ANT	321	(4)
History of Art of United States	ART	215	(4)
Public Opinion, Propaganda and Mass Media	COM	413	(4)
Survey of American Literature	ENG	212	(4)
Introduction to Ethnic Studies	EST	201	(4)
United States and Canada Geography	GEO	350	(4)
United States History	HST	201	(4)
The Black Man in America	HST	336	(4)

History of the American Indians	HST	337	(4)
Diplomatic History of the United States	HST	340	(4)
American Philosophy	PHL	320	(4)
Constitutional Law	PLS	401	(4)
American Political Thought	PLS	433	(4)
Contemporary American Scene	SSC	401	(4)
Total units required for the minor			(32)

Course Descriptions

AMS 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AMS 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

AMS 301 American Studies in Perspective (4)

Methods and techniques of contemporary American Studies including culture concepts, scientific school, media approaches, symbol-myth school, and others. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

AMS 333 Varieties of American Culture (4)

Selected forms of cultural life in America. Emphasis on identifying both distinction and coherence in cultural forms such as music, art, architecture, and fashion as perceived by and expressed among different groups. Includes personal experience in understanding of cultural meanings. 4 lecture-discussions.

AMS 345 American Ideologies (4)

Explores significant beliefs about the meaning of America. Organized around theme of optimism concerning the potential and uses of American power, influence and opportunity. 4 lecture-discussions.

AMS 350 Women in American Society (4)

Overview of women's status in modern civilization and historical review of women's experience in America. Effects of Christianity and industrialization on women. Problems confronting women in this century. 4 lecture-discussions. Prerequisite: EWS 145 or permission of instructor.

AMS 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AMS 401 American Studies in Theory and Practice (4)

Structure and philosophy in American Studies. Vocational application of the discipline. 4 hours seminar. Prerequisite: AMS 301 or AMS 333 or permission of instructor.

AMS 450 American Dreams, Myths, and Realities (4)

Elements of the unique American experience, including some of the dominant myths; application of the various methodologies of American Studies. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

AMS 463 Senior Seminar (4)

Senior discussion of pertinent issues affecting the content and dynamics of American studies. Prerequisite: AMS 301.

AMS 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory or a combination of both.

ANTHROPOLOGY/GEOGRAPHY

One of the four majors offered in the social sciences department is anthropology/geography. For other programs in the department see American studies, philosophy, and social sciences.

Walter P. Coombs, *Chair,* Social Sciences Department

David G. Lord, *Anthropology Coordinator*

Crane S. Miller, *Geography Coordinator*

Thomas C. Blackburn — Forrest L. McElhoe — Yolanda T. Moses

Joan M. Greenway — Emilo J. Stanley

The anthropology/geography degree program, which is housed in the Department of Social Sciences, is designed to provide an understanding of the variety of mankind's physical and cultural environments by examining the dynamic systems (both natural and man-made) through which these diverse settings are changed or sustained. The student majoring in anthropology/geography is guided to analyze and apply to human problems the distinctive ways in which people in various cultures perceive the world and adapt to it. Attention is given to the relationships between expanding populations, increasing per capita use of resources and recognition of present and potential energy and raw material crises.

By appraising the sociocultural tensions of modernization and enforced acculturation in various environmental settings, students are brought to deeper insights and practical understanding of their own Californian community and its future in the broad society.

Training in this major, therefore, provides a broad and suitable background for careers requiring an understanding of peoples, groups, and their cultural and regional institutions. Careers specifically related to this program include secondary teaching, government employment in various capacities, regional planning, and travel industries as well as a variety of consultant roles in business and management. Preparation for graduate training in either discipline is also offered to majors.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Physical Anthropology	ANT	101	(4)
Introduction to Cultural Anthropology	ANT	102	(4)
Environment, Technology & Culture	ANT	350	(4)
Social Anthropology	ANT	358	(4)
Physical Geography	GEO	101	(4)
Cultural Geography	GEO	102	(4)
Image and Map Interpretation	GEO	103	(4)
Undergraduate Seminar	SSC	463	(2)

The core is completed by the addition of 40 units of upper division work in Anthropology and/or Geography chosen in consultation with the student's advisor.

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S.History	HST	202	
Basic Biology	BIO	115	(5)
Freshman Composition	ENG	104	(4)
Physical Geology	ESC	111	(3-5)
Public Speaking	SP	100	(4)
Logic & Semantics	PHL	202	(4)
World Religions	PHL	210	(4)
or World Religions	PHL	211	
General Psychology	PSY	201	(4)
Principles of Sociology	SOC	201	(4)
Social Sciences Methodology	SSC	333	(4)
Elementary Statistics	STA	120	(4)
Courses to complete General Education requirements			(22-24)
Electives			(52)

ANTHROPOLOGY MINOR

Introduction to Physical Anthropology	ANT	101	(4)
Introduction to Cultural Anthropology	ANT	102	(4)
Indians of California	ANT	320	(4)
or Indians of North America	ANT	321	
Peoples and Cultures of Mesoamerica	ANT	322	(4)
or Peoples and Cultures of Africa	ANT	324	
Environment, Technology and Culture	ANT	350	(4)
or The Anthropology of Modernization	ANT	353	
or Political Anthropology	ANT	354	
Culture and Personality	ANT	355	(4)
Social Anthropology	ANT	358	(4)
Field Archaeology	ANT	394	(4)
Total units required in minor			(32)

GEOGRAPHY MINOR

Physical Geography	GEO	101	(4)
Cultural Geography	GEO	102	(4)
Image and Map Interpretation	GEO	103	(4)
The student must select two of the following courses:			(8)
Field Geography	GEO	309	(4)
Earth from Space	GEO	310	(4)
Cartography	GEO	311	(4)
Economic Geography	GEO	312	(4)
Political Geography	GEO	313	(4)
Urban Geography	GEO	315	(4)
Advanced Cartography (prerequisite: GEO 311)	GEO	411	(4)
The student must select three of the following courses:			(12)
Developing World Regions	GEO	340	(4)
Travel Geography	GEO	345	(4)
U.S. and Canada Geography	GEO	350	(4)
Geography of California	GEO	351	(4)
Geography of Latin America	GEO	352	(4)
Soviet Union: Environment and People	GEO	353	(4)
Europe: Land and People	GEO	359	(4)
Total units required in minor			(32)

Note: Both the Geography and the Anthropology Minors may be taken by Social Science Majors.

Anthropology

ANT 101 Introduction to Physical Anthropology and Prehistory (4)

Man as a bio-cultural species; evolution of human behavior as an adaptive biological process; human nature as species-specific behavior; human variability viewed from both a diachronic and synchronic perspective. 4 lecture-discussions.

ANT 102 Introduction to Cultural Anthropology (4)

The nature of culture and cultural phenomena; comparative social organization; religion and value systems of non-literate and folk peoples; cultural and psychological processes in the development of personality. 4 lecture-discussions.

ANT 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ANT 320 Indians of California (4)

Major ethnic groups of aboriginal California, with emphasis upon their social and linguistic diversity. Designed to provide a broad appreciation of the technological, social, and ideological life of the native peoples of California through the detailed study of representative societies. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 321 Indians of North America (4)

Survey of aboriginal peoples of North America; analysis of various adaptations and cultural subsystems in original culture areas. Post-contact developments; the status and role of native Americans present and future. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 324 Peoples and Cultures of Africa (4)

Ethnology of bands, tribes, chiefdoms, and aboriginal states of Africa. Comparison and contrast of varying adaptations to similar and dissimilar environmental situations; nature and consequences of colonial contact; assimilation and/or acculturation. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 350 Environment, Technology and Culture (4)

Interrelationship of subsistence patterns and economic arrangements as they affect levels of socio-cultural development and are themselves constrained by the natural and social environment in which they occur. Tools and techniques whereby a given society exploits its surroundings. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 351 Peasant Societies (4)

Peasantry as a distinctive socio-cultural entity; subsystems—economics, politics, ideology, social organization—in peasant society. In-depth examination of representative peasantry from selected areas, and current efforts at modernization. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 352 The Anthropology of Modernization (4)

Economic anthropology; socio-cultural change and the phenomenon of "modernization" throughout the non-Western world. Emphasis on processes and institutional adaptations relating to evolving economic activities in a variety of cultures. Dynamic nature of cultural and cultural sub-systems as viewed from a developmental perspective. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 354 Political Anthropology (4)

Organization of legal and governmental activities in traditional societies of varying degrees of complexity. Law and the maintenance of order; resolution of conflict; decision making; political bodies and their ideologies. Political institutions in relationship to other social institutions. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 355 Culture and Personality (4)

Socio-cultural examination of individual behavior and development; cross-cultural perspective related to "national character," "normalcy," and "abnormalcy," child rearing, and other personality factors. Prerequisite: ANT 102 or permission of instructor. 4 lecture-discussions.

ANT 356 Anthropology of Folklore (4)

Study of oral traditions in their cultural context. Emphasis on cognitive and symbolic behaviors. Comparative methods, with reference to native oral traditions, social structure, ritual, and world view. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 357 The Anthropology of Health

Cross-cultural survey of health, disease, and medicine. Etiology, epidemiology, nutrition, life cycle problems, and health care programs in Western and non-Western cultures. Emphasis on cultural factors in prevention, diagnosis, and treatment of health problems. 4 lecture-discussions. Prerequisites: ANT 101, or ANT 102, or permission of instructor.

ANT 358 Social Anthropology (4)

A comparative, functional approach to social organization and social structure in various societies; culture, society, and personality; family, kinship, and marriage; social role and social rank; law and politics; religious systems; social change. 4 lecture-discussions. Prerequisite: ANT 102, or permission of instructor.

ANT 360 Anthropology of Religion (4)

Recognition and cross-cultural comparison of the components of man's religions at all levels of social organization. Analysis of early and contemporary theories of origin and process including revitalization movements. Witchcraft and sorcery as social institutions. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 390 The Anthropological Experience (4)

Theory and techniques of ethnographic inquiry. Participant observation, directive and open interviewing, integration and interpretation of data; personal response to field commitment. 4 lecture-discussions. Prerequisite: ANT 102 or 358 or permission of instructor. Offered in odd-numbered years.

ANT 393 World Prehistory (4)

Investigation of the roots of civilization through a survey of Old and New World prehistoric developments. Comparison and contrast of archaeological data showing evolution from basic cultural forms to urban life and formation of agriculturally-based state systems. 4 lecture-discussions. Prerequisite: ANT 102 or permission of the instructor.

ANT 394 Field Archaeology (4)

Introduction to the strategy and techniques of archaeological excavation. Site surveying and mapping; sampling techniques; recording; photography. Excavation of actual archaeological site. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 395 Laboratory Analysis in Archaeology (4)

Laboratory processing, analysis and description of archaeological data. Typological problems; quantitative and qualitative approaches to archaeological assemblages; experimental archaeology. 2 lectures, 4 hours activities. Prerequisite: ANT 102 or permission of instructor. May be repeated once for credit.

ANT 399 Cultural Areas of the World (4)

Enthnographic and ethnohistorical survey of selected cultural areas depending on available faculty specilization. Analysis of contemporary as well as traditional societies through ethnographic documents and first-hand field data. 4 lecture-discussions. Prerequisite: ANT 102 or permission of the instructor. May be repeated for additional credit whenever a new area is offered.

ANT 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ANT 405 Woman: An Anthropological View (4)

Intensive cross-cultural examination of woman, from simple hunting/gathering bands through full evolutionary development to post-industrial society. Includes physical anthropology of woman; role and status; culture and personality studies; affective and contractual bonding; future trends in relationships. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 440 Man the Primate: Comparative Primatology (4)

Biosocial traits and range of variation in the Order of Primates both human and non-human; reviews evolutionary background and present characteristics of prosimians, New World monkeys, Old World monkeys, apes, and man. Examines human species within a comparative perspective. 4 lecture-discussions.

ANT 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Lecture/laboratory. Prerequisite: permission of instructor.

ANT 550 Anthropology for the Professions (1-4)

Application of anthropological data and theory in non-anthropological careers. Cross-cultural perspectives on education, law, medicine, social services, and other areas depending on available staff. Seminar/workshop, 1 to 4 hours. May be repeated for a maximum of 8 units. Prerequisite: permission of instructor.

Geography

GEO 101 Physical Geography (4)

Basic principles of physical geography. Significance of earth-related distribution patterns with reference to their effect on man's activities. 4 lecture-discussions.

GEO 102 Cultural Geography (4)

Basic principles of cultural geography. Significance of people-related distribution patterns with reference to their effect on man's activities. 4 lecture-discussions.

GEO 103 Image and Map Interpretation (4)

Fundamental techniques of airphoto and satellite image interpretation and reading of general reference and thematic maps as they apply to understanding both physical and cultural features depicted in images and maps. 4 lecture-discussions.

GEO 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

GEO 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

GEO 309 Field Geography (4)

Basic methods of geographic field analysis of small areas, including both rural and urban types, and physical and cultural aspects. Theory and practice in field sampling. 4 lecture-discussions.

GEO 310 Earth from Space (4)

An introduction to remote sensing, including an overview of the various photographic and non-photographic sensors and their aerial, satellite, and other platforms. Discussion of the applications of remote sensing in the natural and social sciences and environmental planning. 4 lecture-discussions. Prerequisite: GEO 101 or 103 or ESC 111 or equivalent.

GEO 311 Cartography (4)

The preparation of maps and charts including a survey of source materials such as maps, aerial photographs, and census and other statistical data. The interpretation of maps and aerial photographs as a source of geographic patterns. 3 lectures, 1 three-hour laboratory.

GEO 312 Economic Geography (4)

Economic aspects of man's environment. Economic implications of the distribution and location of natural resources throughout the world. Economic significance of physical and cultural landscapes. 4 lecture-discussions.

GEO 313 Political Geography (4)

The role of factors such as location, size, shape, surface, climate, natural resources, economic aspects in the rise and fall of states. The advantages and disadvantages of nations in relation to natural and cultural conditions. Current problems in domestic and international affairs. 4 lecture-discussions.

GEO 315 Urban Geography (4)

Origin and evolution of cities; their size, functions, distribution patterns, supporting and tributary areas, and roles within the whole political, social, and economic structure of a region; suburbs; problems of metropolitan areas. 4 lecture-discussions.

GEO 340 Developing World Regions (4)

A general survey of selected regions of the world that are of greatest importance in global affairs, stressing topics from political and economic geography and using one of the regional approaches. Major geographical problems and relationships; significant human activities in relation to the natural environment. 4 lecture-discussions.

GEO 345 Travel Geography (4)

The geography of tourism and recreation in selected regions of the world. Aspects of physical and cultural geography that directly affect the tourist industry. 4 lecture-discussions.

GEO 350 U.S. and Canada Geography (4)

An analysis of the physical, cultural, and regional patterns of the United States and Canada with emphasis on the economic geography of the area. 4 lecture-discussions.

GEO 351 Geography of California (4)

Location and description of California's natural resources. The influence of physical features upon the economic activities and sequence of occupation of California, with particular attention to the relationship of current California problems to their geographical causes. 4 lecture-discussions.

GEO 352 Geography of Latin America (4)

Physical, cultural, regional patterns of Mexico, Central America, South America, and the islands of the Caribbean. 4 lecture-discussions.

GEO 353 Soviet Union: Environment and People (4)

An analysis of major current trends in Soviet social, cultural, economic, and political developments and the changing international role of the Soviet Union, as related to the natural environment and regional patterns of the USSR. 4 lecture-discussions.

GEO 357 Geography of Asia (4)

Non-Soviet Asia from the Middle East to Japan and southward to Indonesia. Emphasis on environmental, cultural and political patterns and their relevance to current problems.

GEO 358 Geography of Africa (4)

Physical, cultural, and regional patterns of the nations of Africa. Emphasis within regions on development patterns of the new countries in Africa. 4 lecture-discussions.

GEO 359 Europe: Land and People (4)

The natural environment and the cultural landscape of Europe. Major current trends in social, cultural, economic, and political developments in Western and Eastern Europe; historical and geographical regional diversity and the quest for new unity. 4 lecture-discussions.

GEO 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

GEO 409 Advanced Field Techniques (4)

Analysis and evaluation of the geographical characteristics of the natural emvironment and its human use; field mapping, systematic and random sampling of spatial phenomena, and environmental impact reporting. 4 lecture-discussions. Prerequisite: GEO 309 or permission of instructor.

GEO 410 Photographic Remote Sensing (4)

Interpretation of spatial and spectral information from imagery produced in the photo-sensitive region of the electromagnetic spectrum. Experimentation with multispectral photography of the environment. Radial-line mapping and mosaicking from air-photos and satellite photos. 4 lecture-discussions. Prerequisite: GEO 310 or permission of instructor.

GEO 411 Advanced Cartography (4)

Advanced application in theory and practice of modern cartographic principles. Emphasis on terrain representation, color separation, computer cartography, scribing, and reproduction. 3 lectures, 1 three-hour laboratory. Prerequisite: GEO 311 or equivalent.

GEO 420 Digital Image Processing (4)

Use of computers in remote sensing. Problem-solving and interpretation through aerial photographs and scanner images digitally processed to examine the ground scene. Key concepts: reflectance/emittance of terrain features, image restoration, enhancement, classification, and storage. Prerequisite: CS 101 or CIS 110 and GEO 410 or permission of instructor.

GEO 421 Computer Cartography (4)

Utilization of computers to draw maps. Coverage of SYMAP and other computer mapping programs using both line printers and plotters as output devices. Application of geographic information systems. Prerequisite: CS 101 or CIS 110 and GEO 411 or permission of instructor.

GEO 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

GEO 550 Special Topics in Geography (1-4)

Review of selected topics in geography, chosen to answer the needs and interests of prospective students. Seminar/workshop, 1 to 4 hours. May be repeated for a maximum of 8 units. Prerequisite: graduate standing or permission of department.

ART

Joe Hannibal, *Chair*
Diane Divelbess
Eileen M. Fears
Charles D. Fredrick
Walter W. Glaser
Maren H. Henderson
Yoram Makow
Stanley C. Wilson

The art major program provides a sequence of courses leading to the bachelor of arts degree in studio art. The program is geared to creative problem solving, to aesthetic understanding and production of art forms, and to the development of solid skills in both studio and academic endeavors.

Students majoring in art should expect to develop a wide range of skills rather than a narrow specialization. Such skills will enable them to find employment in art and related fields, or to pursue their education at the graduate level. Each student shall be required before graduation to demonstrate these skills in the form of a portfolio review conducted by the faculty.

Because art is one of the approved subjects for the California Single Subjects Teaching Credential, a student majoring in art at Cal Poly may wish to prepare for a career in teaching.

A number of art courses are available for the general university student as well.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Painting	ART	120	(3)
Introduction to Clay	ART	130	(3)
Introduction to Drawing	ART	140	(3)
Intermediate Drawing	ART	141	(3)
Introduction to Design	ART	150	(3)
Printmaking	ART	160	(3)
Fundamentals of Sculpture	ART	180	(3)
Introduction to Crafts	ART	190	(3)
History of Western Art	ART	212	(4)
History of Western Art	ART	213	(4)
History of Western Art	ART	214	(4)
Life Drawing	ART	244	(3)
Lettering	ART	251	(3)
Art 20th Century	ART	313	(4)
Senior Project	ART	461	(2)
Senior Project	ART	462	(2)
Undergraduate Seminar	ART	463	(2)
Minimum of 24 upper division units in art chosen in consultation with advisor			(24)
Portfolio review also required.			

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Introduction to Theatre	DR	203	(4)
or Music Fundamentals	MU	100	
or Survey of Music	MU	104	
or Meaning of Architecture	ENV	112	
History of Civilization	HST	101	(4)
or History of Civilization	HST	102	
Literature or Foreign Lanaugage (from GE III-C)			(4)
Acrylic Painting	ART	224	(3)
or Watercolor	ART	225	
or Oil Painting	ART	226	
Acrylic Painting	ART	324	(3)
or Watercolor	ART	325	
or Oil Painting	ART	326	
or Life Drawing	ART	344	
or Expressive Drawing	ART	345	
Courses to complete General Education Requirements			(52)
Approved electives, chosen in consultation with advisor			(18)
Free Electives			†(14)

†The total curriculum must include 60 units of upper division courses.

ART HISTORY MINOR

History of Western Art	ART	212	(4)
History of Western Art	ART	213	(4)
History of Western Art	ART	214	(4)

The student will select five additional courses (20 units), three of which must be upper division (12 units) from the following:

History of Tribal Arts	ART	211	(4)
History of Art in the USA	ART	215	(4)
Foundations of Modern Art	ART	312	(4)
Art of the Twentieth Century	ART	313	(4)
Art of the Ancient Civilizations	ART	315	(4)
Art of the Classical World	ART	316	(4)
Art of the Middle Ages	ART	317	(4)
Art of the Italian Renaissance	ART	318	(4)

Course Descriptions

(Courses designated with * may be repeated for a total of 9 units)

ART 110 The Visual Arts (4)

Introduction to the visual arts. A comprehensive survey/analysis to foster appreciation and understanding of traditional and experimental art forms as they relate to human needs. 4 lectures.

ART 120 Introduction to Painting (3)

Image as painting. Varied projects designed to foster development of visual equivalents for ideas and emotions using basic painting skills. 6 hours of activities.

ART 130 Introduction to Clay (3)

Exploration of fundamentals of ceramic materials utilizing slab, coil, and mold making. Emphasis on developing creative ability. 6 hours of activities.

ART 140 Introduction to Drawing (3)

Analysis and practice of drawing. Problems involving development of perception. Emphasis on concepts and methods. 6 hours of activities.

ART 150 Introduction to Design (3)

Development of appreciative and creative skills. Variety of materials used, with an emphasis on two dimensional design concepts. 6 hours of activities.

ART 160 Printmaking (3)

Methods and techniques of printmaking. Relief, intaglio, and silk screen processes. 6 hours activities.

ART 180 Fundamentals of Sculpture (3)

Fundamentals of sculpture involving modeling or carving clay, plaster, wood, stone, and metal. 6 hours activities.

ART 190 Introduction to Crafts (3)

Basic projects with various craft materials. Development of two- and three-dimensional skills and concepts through the materials and their properties. Criteria applied to craft materials. 6 hours of activities.

ART 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ART 211 History of Tribal Arts (4)

Art of tribal cultures—African, Oceanic, North American Indian—within context of religious beliefs and social function. 4 lectures.

ART 212 History of Western Art (4)

Comprehensive survey and analysis of the development of art in Western civilizations from prehistoric times to the Renaissance. 4 lectures.

ART 213 History of Western Art (4)

Comprehensive survey and analysis of the development of art in Western civilizations from the Renaissance to the 18th century. 4 lectures.

ART 214 History of Western Art (4)

Comprehensive survey and analysis of the development of art in Western civilization from the 18th to the 20th centuries. 4 lectures.

ART 215 History of Art of the United States (4)

Survey of the art of the United States from colonial times to the present. European tradition, frontier art forms, regionalism, social realism, international art style. 4 lectures.

ART 219 Art of Mexico and the Southwest (4)

The arts of pre-Columbian Mexico, the Spanish Conquest, and the colonial period of Mexico to the present; the American Southwestern Indian arts. 4 lectures.

ART 224, 324 * Acrylic Painting (3) (3)

Methods and techniques with acrylics. Emphasis on form and composition. 6 hours activities. Prerequisite: ART 120 or permission of instructor; 224 prerequisite to 324.

ART 225, 325 * Transparent Watercolor Painting (3) (3)

Methods and techniques with transparent watercolor. Outdoor sketching and studio projects. 6 hours activities. Prerequisite: ART 120 or permission of instructor; 225 prerequisite to 325.

ART 226, 326 * Oil Painting (3) (3)

Studio course in oil painting techniques. 6 hours activities. Prerequisite: ART 120 or permission of instructor; 226 prerequisite to 326.

ART 232 Pottery (3)

An introduction to ceramic design. Basic methods of forming, decorating, glazing, and firing pottery forms with an emphasis on the use of the potter's wheel. 6 hours activities.

ART 234, 334 Ceramics (3) (3)

Intensified study of ceramic and sculptural forms produced on the potter's wheel; study of glaze calculation and firing processes. 6 hours activities. Prerequisite: ART 232; 234 prerequisite to 334.

ART 235, 335 Raku (3) (3)

Introduction to asymmetrical forms with an emphasis on low-fire glaze calculations. Aspects of primitive kiln construction with concentration on reduction firings. 6 hours activities. Prerequisite: ART 130 or permission of instructor.

ART 243 Schematic Drawing (3)

Developing graphic images through schematic analysis methods, e.g., perspective. Emphasis on developing perceptual and conceptual abilities with a minimum of mechanical devices. 6 hours activities. Prerequisite: ART 140 or permission of instructor.

ART 244 Life Drawing (3)

Skills and techniques in drawing the human figure from studio models. 6 hours activities. Prerequisite: ART 140 or permission of instructor.

ART 246, 346 Drawing for Illustration (3) (3)

Developing graphic images that accurately depict things and situations. Communicating concepts through graphic media. 6 hours activities. Prerequisites: ART 243, 244; 246 prerequisite to 346.

ART 251 Lettering (3)

Development of appreciative and skillful usage of alphabets. Techniques of forming and spacing letters. 6 hours activities.

ART 252, 352 Graphic Layout (3) (3)

Design principles of visual communication. Projects in page layout, corporate image, and advertising design. 6 hours activities. Prerequisite: ART 251 or permission of instructor; 252 prerequisite to 352.

ART 253, 353 Two-Dimensional Design (3) (3)

Elements and principles of two-dimensional design, especially color theory and visual perception. 6 hours activities. Prerequisite: ART 150 or permission of instructor; 253 prerequisite to 353.

ART 261, 361 Relief Printmaking (3) (3)

Exploration of materials and processes in relief printing including block carving, collage and assemblage techniques. 6 hours activities. Prerequisite: ART 160 or permission of instructor; 261 prerequisite to 361.

ART 262, 362 Silk Screen Printmaking (3) (3)

Silk screen as an art form emphasizing techniques with paper, glue, and lacquer film stencils. 6 hours activities. Prerequisite: ART 160 or permission of instructor; 262 prerequisite to 362.

ART 263, 363 Intaglio Printmaking (3) (3)

Techniques and skills in intaglio methods of printmaking including drypoint, etching, aquatint, mezzotint and engraving. 6 hours of activities. Prerequisite: ART 160 or permission of instructor; 263 prerequisite to 363.

ART 281, 381 Sculpture: Wood and Stone (3) (3)

Contemporary approach to traditional wood and stone materials. Selection of materials, tools, and finishes. 6 hours activities. Prerequisites: ART 180 or permission of instructor; 281 prerequisite to 381.

ART 283, 383 Sculpture: Casting (3) (3)

Techniques and skills using media such as plaster resin and latex with special emphasis on mold making. 6 hours activities. Prerequisite: ART 180 or permission of the instructor.

ART 285 Sculpture: Non-Ferrous Cast Metals (3)

Aesthetic selection and use of material in lost wax, resin-bonded sand, and ceramic shell casting techniques. 6 hours activities. Prerequisite: ART 180 or permission of instructor.

ART 287, 387 Three-Dimensional Design (3) (3)

Theory and application of aesthetic elements in three-dimensional forms. 6 hours activities. Prerequisite: ART 180 or 295 or permission of instructor; 287 prerequisite to 387.

ART 288, 388 Gallery and Exhibition Design (3) (3)

Professional practices in gallery and exhibition management. Scheduling, receiving and delivery, display, brochure design and receptions, using university galleries. 6 hours activities. ART 288 prerequisite to 388.

ART 295, 395 Crafts Design (3) (3)

Development of concepts, methods, and skills in basic craft media such as clay, wood, metal, and fiber construction. 6 hours activities. Prerequisite: ART 190 or permission of instructor; 295 prerequisite to 395.

ART 297, 397 Jewelry (3) (3)

Fundamental metal processes in jewelry design. Cutting, forging, soldering, casting, etching of copper, bronze, and silver. 6 hours activities. Prerequisite: ART 190 or 295 or permission of instructor; 297 prerequisite to 397.

ART 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ART 312 Foundations of Modern Art (4)

Comprehensive survey and analysis of the founding movements and development of the visual arts in the West from mid-19th to mid-20th century. 4 lectures.

ART 313 Art of the 20th Century (4)

Analysis of the visual arts in Europe and the United States from post-World War II to the present. 4 lectures. Prerequisite: ART 312.

ART 315 Art of Ancient Civilizations (4)

Survey of the arts of ancient civilizations, primarily Egypt and Mesopotamia, showing the interrelations and cultural exchanges of the ancient world. 4 lectures.

ART 316 Art of the Classical World (4)

Survey of the arts of the classical world; the development of Greek, Etruscan, and Roman art. 4 lectures.

ART 317 Art of the Middle Ages (4)

Survey of art and architecture of the European Middle Ages, from the 6th century through the Gothic period. 4 lectures.

ART 318 Art of the Italian Renaissance (4)

Survey of art and architecture of Italy of the 14th through 16th centuries. 4 lectures.

ART 327 Multimedia Painting (3)

Painting projects in mixed media. Discovering visual effects by combining traditional and nontraditional methods and techniques. 6 hours activities. Prerequisite: ART 224 or 225 or 226 or permission of instructor. May be repeated once for credit.

ART 328 Figure and Portrait Painting (3)

Methods and techniques of representing human and other animate forms with painting media. 6 hours of activity. Prerequisites: ART 224 or 226; 244.

ART 336 Kiln Construction and Repair (3)

The design and understanding of kiln construction and repair with emphasis on the building and firing processes. 6 hours activities. Prerequisite: ART 234.

ART 338 Ceramics: Glaze Calculations (3)

Analytical approach to the development of glazes; working knowledge of the empirical formula; understanding of glaze materials. 6 hours activities. Prerequisite: ART 130.

ART 342 Drafting for Artists (3)

Basic mechanical drawing techniques and interpretations; architectural drafting, furniture detailing, blueprint reading, and graphic communication. 6 hours activities. Prerequisite: ART 243 or permission of instructor.

ART 344 Life Drawing (3) *

Drawing for creative expression from studio models using variety of drawing materials. 6 hours activities. Prerequisite: ART 244 or permission of instructor. May be repeated once for credit.

ART 345 Expressive Drawing (3) *

Advanced problems in draftsmanship with special emphasis on linear and textural expression. 6 hours activities. Prerequisite: ART 140 or permission of instructor. May be repeated once for credit.

ART 354 Graphic Media and Production (3)

Advanced study of the graphic media and their practical applications. Methods and procedures for preparing two-dimensional design for reproduction. 6 hours activities. Prerequisites: ART 251, 252.

ART 382 Sculpture: Clay Modeling (3)

Study of human anatomy by sculpting the figure in clay. 6 hours activities. Prerequisites: ART 180 or 287; 244.

ART 385 Sculpture: Metal Casting (3)

Lost wax and sand techniques used when casting lead, aluminum, bronze and cast iron. May be repeated once for credit. 6 hours activities. Prerequisite: ART 180, 283 or permission of instructor.

ART 391 Fibers (3) *

Fiber as a sculptural medium. Includes techniques of carding, spinning, and dyeing. 6 hours activities. Prerequisite: ART 295 or permission of instructor.

ART 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ART 405 Art in the Classroom (4)

Art education theory and curriculum design. Evaluation techniques, art materials and skills. 3 lectures, 3 hours of laboratory. Prerequisite: permission of instructor.

ART 425 Advanced Watercolor (3)

Advanced techniques in wet, cross wash and compositional development. Two 3-hour activities. Prerequisite: ART 225, 325 or permission of instructor.

ART 430 Production Ceramics (3)

Development of designs in clay, with an emphasis on mass production. 6 hours activities. Prerequisite: ART 338 and 339 or permission of instructor.

ART 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision and culminating in a public exhibit or presentation of research. Minimum 120 hours total time. Prerequisite: senior standing and completion of 12 units in area of emphasis.

ART 463 Undergraduate Seminar (2)

An open forum of senior students in which the latest developments and practices in art criticism, education, and professional studio and gallery management are discussed. 2 lectures.

ART 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

BEHAVIORAL SCIENCES

Gary A. Cretser, *Chair*

Sonia L. Blackman
Wayne C. Brown
Sidney Carlin
Nancy J. Harkey
William F. Hill
Louis J. King
William R. Larson
Marcia E. Lasswell
Joseph J. Leon
Frederick B. Meeker
David G. Null
Joseph L. Philbrick
Robert M. Schwieder
Donald V. Shupe
Joice B. Stone
Felicia F. Thomas
Wayne S. Wooden

The department offers courses leading to the degree of Bachelor of Arts in Behavioral Sciences. The core curriculum for this degree is composed of courses in psychology and sociology, with additional emphasis on anthropology courses from elsewhere in the university.

Instruction in the department is intended to provide a background for understanding human behavior, in both individual and collective aspects. The interdisciplinary orientation and varied offerings of the department allow students to select a major curriculum, in concert with faculty advisors, which best supports their aspirations for post-college employment or advanced education.

In keeping with this orientation, five options are offered within the Behavioral Science Department. The Behavioral Sciences Option is offered with a minimum number of required courses so that a high degree of flexibility can be achieved in personal curriculum planning. This option is particularly well suited for combination with the Criminal Justice and Corrections Minor within the department or with a relevant minor outside the department.

The Applied Social Psychology/Sociology Option is designed for students planning careers in applied social research, evaluation research and program evaluation at various levels in both government and industry.

The Experimental and Clinical Option is designed to provide a background for students who are preparing for graduate study in these two areas of psychology.

The Sociology Option is designed for students who wish to emphasize sociology in their curriculum and/or may be planning to go to graduate school in sociology or a related area.

The Counseling and Human Services Option is designed for students who are preparing for pre-professional training and/or graduate training in counseling.

The introductory courses in psychology and sociology are prerequisites to most of the upper division offerings.

The Criminal Justice and Corrections minor (also a certificate program) is a multidisciplinary grouping of courses which have been specifically selected to fulfill the needs of students presently working in or planning for careers in law enforcement or corrections. Special advisement for students in any major who are interested in criminal justice or corrections may be obtained from the department's criminal justice coordinator. Detailed information is available from the departmental office.

CORE COURSES FOR MAJOR

(Required of all students)

Meth Behavioral Science	BHS	204	(4)
Meth Behavioral Science	BHS	205	(4)
Principles of Psychology	PSY	202	(4)
Principles of Psychology	PSY	203	(4)
Social Psychology	PSY	401	(4)
Prin of Sociology	SOC	201	(4)
Prin of Sociology	SOC	202	(4)
Soc Organization	SOC	310	(4)
or Class, Status and Power	SOC	410	

OPTION COURSES FOR MAJOR

(Required in specific options)

APPLIED SOCIAL PSYCHOLOGY/SOCIOLOGY

Choose *one* course from group A and B below (not to include courses taken above)

Group A: SOC 310, SOC 410, SOC 350, SOC 402, SOC 405 ..... (4)

Group B: PSY 303, PSY 334, PSY 402, PSY 410, PSY 433, PSY 460 ..... (4)

Stat for Behav Sci	BHS	307	(4)
Computer Methods in Behav Sci	BHS	340	(4)
Applied Soc Psy/Soc	BHS	426	(4)
Senior Project	BHS	461	(2)
Senior Project	BHS	462	(2)
Undergraduate Seminar	BHS	463	(2)
Psy Testing	PSY	416	(4)
Industrial	PSY	332	(4)
Buyer Behavior	MKT	411	(4)
Survey Research	SOC	433	(4)

BEHAVIORAL SCIENCE

Choose *one* course from group A and B below (not to include courses taken above)

Group A: SOC 310, SOC 410, SOC 350, SOC 402, SOC 405 ..... (4)

Group B: PSY 303, PSY 334, PSY 402, PSY 410, PSY 433, PSY 460 ..... (4)

Senior Seminar ..... BHS 498 (4)

Approved electives in BHS, PSY, SOC, ANT, 300-400 level (except for 400 and 499), chosen in consultation with advisor ..... (20)

COUNSELING AND HUMAN SERVICES

Choose *one* course from group A and group B below (not to include courses taken above)

Group A: SOC 310, SOC 410, SOC 350, SOC 402, SOC 405 ..... (4)

Group B: PSY 303, PSY 334, PSY 402, PSY 410, PSY 433, PSY 460 ..... (4)
Seminar in Small Group ..... BHS 407 (4)
Senior Seminar ..... BHS 498 (4)
Human Relations ..... PSY 314 (4)
Psy of Personality ..... PSY 403 (4)
Theories of Counseling ..... PSY 412 (4)
Abnormal Psychology ..... PSY 415 (4)
Psychological Testing ..... PSY 416 (4)
Prin Behavior Management ..... PSY 450 (4)
Minority Communities ..... SOC 323 (4)
Intro Soc Welfare ..... SW 201 (4)

EXPERIMENTAL AND CLINICAL PSYCHOLOGY

Choose *one* course from group A, B, and C below (not to include courses taken above)

Group A: SOC 310, SOC 410, SOC 350, SOC 402, SOC 405 ..... (4)
Group B: BHS 407, PE 430, PSY 310, PSY 517 ..... (4)
Stat for Behav. Science ..... BHS 307 (4)
Senior Project ..... BHS 461 (2)
Senior Project ..... BHS 462 (2)
Undergrad. Sem ..... BHS 463 (2)
Physio Psy ..... PSY 303 (4)
Cognitive Processes ..... PSY 334 (4)
Theories Learning ..... PSY 402 (4)
History and Systems ..... PSY 410 (4)
Abnormal Psy ..... PSY 415 (4)
Exper. Psy ..... PSY 433 (4)
Adv. Gen ..... PSY 460 (4)

SOCIOLOGY

Choose *one* course from group A, B and C below (not to include courses taken above)

Group A: SOC 310, SOC 410 ..... (4)
Group B: PSY 303, PSY 334, PSY 402, PSY 410, PSY 433, PSY 460 ..... (4)
Group C: BHS 307, BHS 340, SOC 433 ..... (4)

Choose *two* courses from group D below

Group D: SOC 301, SOC 302, SOC 320, SOC 321, SOC 360, SOC 401, SOC 425 ..... (8)
Senior Project ..... BHS 461 (2)
Senior Project ..... BHS 462 (2)
Pop and Society ..... SOC 330 (4)
Coll Beh & Soc Mov ..... SOC 350 (4)
Soc: Self & Society ..... SOC 402 (4)
Soc Theory ..... SOC 405 (4)

SUPPORT AND ELECTIVE COURSES

(Required in Specific Options)

APPLIED SOCIAL PSYCHOLOGY/SOCIOLOGY

Freshman Comp ..... ENG 104 (4)
Logic and Semantics ..... PHL 202 (4)
Public Speaker ..... SP 100 (4)
Intro to Statistics ..... STA 107 (4)
Professional Writing ..... ENG 301 (4)
Intro to Cult. Anthro ..... ANT 102 (4)
Approved electives (300-400 level) chosen in consultation with advisor ..... (16)
Courses to complete G.E. Requirements ..... (52)
Unrestricted Electives ..... (20)

BEHAVIORAL SCIENCES

Freshman Comp ..... ENG 104 (4)
Logic and Semantics ..... PHL 202 (4)
Public Speaking ..... SP 100 (4)
Adv. Prof. Writing ..... ENG 301 (4)
Intro to Cultural Anthro ..... ANT 102 (4)
Approved electives (300-400 level) chosen in consultation w/advisor ..... (16)
Courses to complete G.E. Requirements ..... (56)
Unrestricted Electives ..... (30)

COUNSELING AND HUMAN SERVICES

Freshman Comp ..... ENG 104 (4)
Logic and Semantics ..... PHL 202 (4)
Public Speaking ..... SP 100 (4)
Adv. Prof. Writing ..... ENG 301 (4)
Intro to Cultural Anthro ..... ANT 102 (4)
Approved electives (300-400 level) chosen in consultation w/advisor ..... (8)
Courses to complete G.E. Requirements ..... (56)
Unrestricted Electives ..... (22)

EXPERIMENTAL AND CLINICAL PSYCHOLOGY

(Partially meets General Education Requirements)

Basic Biology ..... BIO 115 (5)
Human Physio ..... ZOO 235 (4)
Chem Fund ..... CHM 103 (3-4)
or College Chem ..... CHM 104
Logic and Semantics ..... PHL 202 (4)
Intro to Stat ..... STA 107 (4)
Public Speaking ..... SP 100 (4)
Freshman Comp ..... ENG 104 (4)
Adv. Prof. Writing ..... ENG 301 (4)
Intro to Cult. Anthro ..... ANT 102 (4)
Approved electives (300-400 level) chosen in consultation w/advisor ..... (8)
Courses to complete G.E. Requirements ..... (40)
Unrestricted Electives ..... (20)

SOCIOLOGY

Intro to Cultural Anthro ..... ANT 102 (4)
Log & Semantics ..... PHL 202 (4)
Freshman Comp ..... ENG 104 (4)
Public Speaking ..... SP 100 (4)
Adv. Prof. Writing ..... ENG 301 (4)
Approved electives (300-400 level) chosen in consultation w/advisor ..... (8)
Courses to complete G.E. Requirements ..... (56)
Unrestricted electives ..... (30)

CRIMINAL JUSTICE AND CORRECTIONS MINOR

The student must choose a minimum of one course from 4 of the following 5 areas:

1. Personnel Management	ABM	402	(4)
Management Principles & Theory	OM	307	(4)
Industrial & Personnel Psychology	PSY	332	(4)
2. Public Administration	PLS	314	(4)
Judicial Process	PLS	423	(4)
3. Theories of Counseling	PSY	412	(4)
Abnormal Psychology	PSY	415	(4)
Behavioral Management	PSY	450	(4)
4. Criminology	SOC	302	(4)
Juvenile Delinquency	SOC	360	(4)
5. Contemporary Treatment of Offenders	SSV	318	(4)
Probation & Parole	SSV	320	(4)

The student selects four other upper division courses, in consultation with an advisor, from areas 1 thru 5 and courses listed below:

Advanced Professional Writing	ENG	301	(4)
Philosophy of Freedom and Order	PHL	410	(4)
Philosophy of Justice	PHL	415	(4)
Bureaucracy & Administration Behavior	PLS	316	(4)
Criminal Justice System	PLS	404	(4)
Adolescent Psychology	PSY	312	(4)
Human Relations	PSY	314	(4)
Psychology of Identity	PSY	321	(4)
Ethnic Relations	SOC	320	(4)
or Sociology of Minority Communities	SOC	323	
Total units required in minor			(32)

Note: The Minor in Criminal Justice and Corrections may be taken by Behavioral Science Majors.

Course Descriptions

BHS 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

BHS 204, 205 Methods in the Behavioral Sciences (4) (4)

Introduction and intermediate exposure to the methods, techniques, and data analysis used in carrying out research in the behavioral sciences. BHS 204 is primarily experimental methods and BHS 205 is experimental and non-experimental methods. 4 lecture-discussions. Prerequisites: PSY 202, SOC 201; BHS 204 prerequisite to BHS 205.

BHS 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

BHS 307 Statistics for the Behavioral Sciences (4)

Correlational techniques and inferential statistics useful to behavioral scientists. Product moment and rank order correlation coefficients, t-ratios, introduction to analysis of variance, selected non-parametric statistics. Selection, application, and interpretation of appropriate statistics for analysis of behavioral data. 3 lectures, 1 two-hour activity. Prerequisites: STA 107, BHS 204, 205.

BHS 328 Women and Men: Changing Sex Roles (4)

An interdisciplinary survey of gender differences, sex roles, and the issues and controversies, causes and consequences of the changes in men's and women's lives in the last two decades particularly. Historical, cross-cultural and future perspectives will be treated. Lecture, small group discussion, class reports. 4 lecture-discussions.

BHS 340 Computer Methods in Behavioral Science (4)

Survey of computer methods in behavioral science research. Simulations, games, analytic models, humanistic applications, and special techniques. Practice in programming of applied behavioral science problems. 3 lectures, 1 two-hour activity. Prerequisite: one course in basic quantitative methods.

BHS 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

BHS 407 Seminar in Small Groups (4)

Social dynamics in small groups. Study of factors that affect small groups and the behavior of members in small groups. 4 seminars. Prerequisites: BHS 204, junior standing or permission of instructor.

BHS 426 Applied Social Psychology/Sociology (4)

Application of the methods, concepts, and content of sociology and psychology in various settings, including health systems, government agencies, industry and education. Four lecture-discussions. Prerequisites: PSY 202, SOC 201, BHS 204, 205 or equivalent, or permission of instructor.

BHS 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment or interest. Formal written report required.

BHS 463 Undergraduate Seminar (2)

Study and discussion of recent developments in behavioral sciences, contrasted with students' senior project. Prerequisites: BHS 461, 462, permission of instructor.

BHS 498 Senior Seminar (4)

Contemporary concepts, issues, and studies in the behavioral sciences. 4 seminar-discussions. Prerequisites: BHS major and senior standing.

BHS 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

Psychology

PSY 201 General Psychology (4)

Exploration and application of basic psychological principles in understanding self, relationships with others, and interactions with social groups. Stages of psychological development and personality. Psychological approaches to interpersonal relations. Effective and ineffective living. 4 lecture-discussions.

PSY 202 Principles of Psychology I (4)

Survey of scope, methods, content of the more quantitative areas of psychology including: perceptions, conditioning, learning, physiological, sensory processes, statistical methods, and psychometrics; additional areas of contemporary interest selected by instructor. 4 lecture-discussions.

PSY 203 Principles of Psychology II (4)

Survey of scope, methods, content of the more qualitative areas of psychology including: personality, personality assessment abnormal, clinical, social, developmental, language, thinking, memory, motivation and emotion. 4 lecture-discussions.

PSY 303 Physiological Psychology (4)

Relationship of genetic, anatomical and physiological factors to the behavior of organisms, with stress on the relevance of biological mechanisms to an understanding of man. Introduction to research techniques in physiological laboratory. One 3-hour lecture, 3-hour laboratory. Prerequisites: BHS 204, 205, PSY 202, 203.

PSY 305 Basic Developmental Psychology (4)

Theoretical and chronological examination of human development. Influences of heredity, prenatal environment, and psychosocial determinants on personality and social development, sex typing, cognitive and moral development throughout the life span. 4-lecture-discussions.

PSY 310 Child Psychology: Early Childhood (4)

Developmental aspects of the physical, social, emotional, and intellectual growth of the child from birth through the preschool years. Emphasis on factors that facilitate and impede development; early learning and the development of language; growing awareness of self in relation to environment. 4 lectures. Prerequisite: PSY 201 or 202.

PSY 311 Child Psychology: The Middle Years (4)

Developmental aspects of the physical, social, emotional growth of the child from kindergarten years through pre-adolescence. Emphasis on development of social abilities and social awareness; thought processes; awareness of self in relation to environment. 4 lectures. Prerequisite: PSY 201 or 202 or permission of instructor.

PSY 312 Adolescent Psychology (4)

Physical, social, emotional, and intellectual growth of the adolescent. Emphasis on personality formation, social adjustment, and the problem of self-identity. 4 lectures. Prerequisite: PSY 201 or 202.

PSY 314 Human Relations (4)

Human relations problems in contemporary American organizations. Lectures and involvements related to increasing the student's ability to both lead and participate in small group relationships. 3 lectures, 1 two-hour activity. Prerequisite: upper division standing.

PSY 315 Human Relations (4)

Introduction to human motivation in the one-to-one relationship. Effect upon individual behavior of the changing contemporary American culture; techniques of successful two-way communications; structure for professional interviewing. 3 lectures, 1 two-hour activity. Prerequisite: PSY 314.

PSY 316 Human Relations (2)

Study and experiment in techniques for facilitating introspection and self-analysis. 2 one-hour clinics. Prerequisites: PSY 314, 315.

PSY 321 The Psychology of Identity (4)

Psychological aspects of conflict, isolation, assimilation; the psychology of prejudices and discrimination; psychological factors in minority group leadership, group membership identity, and group membership consciousness. 4 lectures. Prerequisite: upper division standing or permission of instructor.

PSY 332 Industrial and Personnel Psychology (4)

Survey of applications of psychology to selection and motivation of employees. Work and efficiency, morale, fatigue, and job safety. Applications of psychological principles to man-machine systems including multiple sensory input. 3 lectures, 1 two-hour activity.

PSY 334 Cognitive Processes (4)

Processes by which humans acquire and maintain knowledge. Focus on the relationships of perception, language and thinking, and concept attainment. Major theories of cognitive development. 4 lectures. Prerequisite: PSY 201 or 202.

PSY 340 Educational Psychology (4)

Psychological principles of the learning process and mental hygiene at the elementary and secondary level. Emphasis on learning and the motivation of the learner. 4 lectures. Prerequisite: PSY 201 or 202.

PSY 401 Social Psychology (4)

Advanced study of human behavior as a product of interaction and social process: nature of group life in relation to social groupings, social conflict, public opinion, group morale, social control, leadership. Small groups, team composition, and nature of prejudice. 4 lectures. Prerequisite: PSY 202, 203, BHS 204 or permission of instructor.

PSY 402 Theories of Learning (4)

Examination of classical learning theories in conjunction with critical examination of current theories. Status and form of contemporary theory. 4 lectures. Prerequisites: PSY 201 or 202 and junior standing.

PSY 403 Psychology of Personality (4)

Advanced study of major contemporary approaches to personality. Emphasis on development and structure of personality. Biological, psychological, and socio-cultural determinants, Dynamics and changes of personality. 4 lectures. Prerequisite: PSY 201 or 202.

PSY 410 History and Systems of Psychology (4)

The major contending theories and systems of contemporary psychology with a focus on humanistic and empirical psychology. History of psychological theories. 4 lectures. Prerequisites: PSY 202, 203.

PSY 412 Theories of Counseling (4)

Systematic and comparative analysis of current psychotherapies; their philosophies, purposes, and procedures. 4 lectures. Prerequisite: PSY 202, 203.

PSY 415 Abnormal Psychology (4)

The causes, description, and treatment of the extremes of human behavior. Emphasis on an integrated analysis from a psycho-social viewpoint. 4 lectures. Prerequisite: PSY 201 or 202.

PSY 416 Psychological Testing (4)

The uses and misuses of psychological tests; construction, standardization, and statistics involved in testing, including objective and projective tests in all areas of measurement, i.e., achievement, motivation, aptitude, personality, and vocational preference. 4 lectures. Prerequisites: PSY 202, 203.

PSY 420 Environmental Psychology (4)

Physical and social contexts of person-environment transaction. Environmental determinants of behavior; environmental assessment. Small group/large group ecologies; environmental design. Future environments. 4 lecture-discussions. Prerequisites: PSY 201 or 202, junior standing or permission of instructor.

PSY 433 Experimental Psychology: Research, Design and Methodology (4)

Research method and design in contemporary experimental psychology. Univariate and multivariate design. Statistical and experimental control techniques in design. Prediction and hypothesis testing. Evaluation of experimental findings. Research ethics. Evaluation of current literature in experimental psychology. Three lectures, one 2-hour activity. Prerequisites: BHS 204, PSY 202, 203, or permission of instructor.

PSY 450 Principles of Behavioral Management (4)

Principles of behavioral management as applicable to home, school, and institutional settings. Currently used approaches to behavioral change studied through analysis of experimental situations and published reports. 4 lectures. Prerequisite: PSY 201 or 202, or equivalent.

PSY 455 Human Sexual Behavior: Relationships (4)

Investigation of human sexual relationships. Students have the opportunity to compare experiences, beliefs and knowledge with other class members; survey of scientific literature. Four lecture-discussions. Prerequisites: BIO 301 or permission of instructor.

PSY 460 Advanced General Psychology (4)

Survey of advanced topics in general psychology. Theories of information and data, problems of measurement and scaling. Classic and contemporary psychophysics. Probabilistic models of learning and memory. Contemporary theories of motivation and perception. 4 lectures. Prerequisites: PSY 202, 203, BHS 204, 205.

PSY 517 Clinical Psychology (4)

Seminar in the profession of clinical psychology; the concept of "abnormality," the theories, research and practice of assessment, psychotherapy, community mental health and the projection of future trends. Prerequisites: PSY 202, 203, 412, 415, senior standing or permission of instructor.

Sociology

SOC 201 Principles of Sociology (4)

Sources of materials and methods of sociological study. Concepts and principles; including contemporary social theory, elementary forms of social organization, culture and socialization. 4 lecture-discussions.

SOC 202 Principles of Sociology (4)

Continuation of the sources of materials and methods of sociological study, including social inequality, population, collective behavior and selected social institutions. 4 lecture-discussions. Prerequisite: SOC 201.

SOC 206 Family Relations (4)

Analysis of dating, courtship, engagement; religious, social and legal factors relating to marriage and early adjustment. Preparation for marriage. 4 lectures.

SOC 301 Contemporary Social Problems (4)

Analysis of leading social problems facing American society today: drugs, crime, poverty, others. 4 lectures. Prerequisite: junior standing.

SOC 302 Criminology (4)

Causal theories, nature, extent, control, and prevention of crimes. Emphasis on prevention and rehabilitation, both inside and outside penal institutions. 4 lecture-discussions. Prerequisites: SOC 201, 202, junior standing.

SOC 310 Social Organization (4)

Structure and function of selected social organizations, with emphasis on social processes, social evolution, and social planning. 4 lectures. Prerequisites: SOC 201, 202, BHS 205 (or concurrent enrollment in BHS 205), or permission of instructor.

SOC 320 Ethnic Relations in America (4)

Social and social-psychological theory in relation to prejudice and discrimination. Emphasis on current ethnic contacts and conflicts in the United States. 4 lecture-discussions. Prerequisites: SOC 201, 202.

SOC 321 Family as a Social Institution (4)

Social and cultural development of the family as an institution, focusing upon its structures, functions and forms of disorganization; analysis of current trends. Four lecture-discussions. Prerequisites: SOC 201, 202 or permission of instructor.

SOC 323 Sociology of Minority Communities (4)

Sources of materials and methods of the sociological study of minority communities; concepts and principles; differential structure and process of minority group life; social institutions in the context of value system conflict; indigenous efforts to alleviate community problems. 4 lectures. Prerequisite: junior standing.

SOC 330 Population and Society (4)

Population trends and problems in modern society. Focus on demographic characteristics of world population, with special reference to urban concentrations and underdeveloped nations. 4 lecture-discussions. Prerequisites: SOC 201, 202.

SOC 350 Collective Behavior and Social Movements (4)

Analysis of mass behavior: crowds, riots, fads, fashions, public opinion, and social movements. 4 lectures. Prerequisites: SOC 201, 202.

SOC 360 Juvenile Delinquency (4)

Juvenile delinquency in California and elsewhere; types and extent; theories of causation; laws, courts, correctional institutions, probation; delinquent subcultures, middle-class delinquency; new programs. 4 lecture-discussions. Prerequisites: SOC 201, 202.

SOC 401 Urban Sociology (4)

The organization of the modern city emphasis on the social problems of the modern industrial urban center. Analysis of trends in urban and suburban communities; ecological patterns and change. 4 lectures. Prerequisite: junior standing or permission of instructor.

SOC 402 Socialization: Self and Society (4)

Analysis of social interaction relating to development of self; reciprocal influences between individual and society. Development of social roles and the symbolic nature of interaction. 4 lectures. Prerequisites: SOC 201, 202.

SOC 405 Sociological Theory (4)

A study of sociological thought. Emphasis on theoretical systems and the contributions of the major schools. 4 lectures. Prerequisites: SOC 201, 202.

SOC 410 Class, Status, and Power (4)

Theories and research concerning social stratification; emphasis on contemporary American society, including the measurement and analysis of social status models; the meaning of social class and the distribution of power. 4 lecture-discussions. Prerequisites: SOC 201, 202, BHS 205 (or concurrent enrollment in BHS 205), or permission of instructor.

SOC 425 Social Gerontology (4)

Review of psycho-social aspects of senescence. Aging as a social problem; demographic issues; the aged as a minority; aging and poverty. 4 lecture-discussions. Prerequisites: SOC 201, 202.

SOC 433 Survey Research (4)

Introduction to and experience with survey techniques: sampling design, questionnaire construction, interviewing strategies, data analysis. Practical application of procedures to specific projects. 3 lectures, 1 two-hour activity.

SOC 550 Special Topics in Sociology (1-4)

Review of selected topics in sociology, chosen according to needs and interests of students. Seminar, 1 to 4 hours. May be repeated for a maximum of 8 units. Prerequisite: permission of instructor.

COMMUNICATION ARTS

T. Harrell Allen, *Chair*

Thomas A. Burdick	Ross F. Figgins	Alfred E. Sheldon
Robert L. Charles	Gary D. Keele	Stanley H. Taylor
David A. Church	Glen D. Phillips	Frank A. Tennant
Robert G. Clark	Ernest D. Rose	Martin I. Wang

A society, becoming increasingly more and more complex, needs individuals to inform, explain, and interpret its problems, its issues. The Communication Arts major prepares students to fill communication positions in the mass media, business, government, and education.

Five Options are offered—Electronic Broadcasting, Newspaper/Magazine Journalism, Public Relations, Organizational Communication, and Specialized Communication Studies.

Electronic Broadcasting is designed for students primarily interested in careers in radio and television broadcasting.

Newspaper/Magazine Journalism prepares students for editorial and supervisory assignments with newspapers, magazines, wire services, and specialized publications.

Public Relations should be chosen by those seeking careers in public relations and advertising and communication positions which require skills and knowledge in these areas.

Organizational Communication features the "total" communicator, providing students instruction in both oral and written skills and theories. Special emphasis is offered in the areas of general communication, applied organizational communication, human communication, and political communication. Students will find employment in large companies through training programs leading to line or staff positions in communication problem solving.

Specialized Communication Studies is for those who seek to use communication skills in a specific area of interest, such as economics, education, theatre, or in positions in government and industry.

Students completing the major are qualified to take advantage of a variety of educational opportunities and to pursue advanced study in professionally oriented graduate schools.

CORE COURSES FOR MAJOR

(Required of all students)

Intro to Mass Communication	COM	101	(4)
Intro to Communication Theory	COM	201	(4)
Applied Communication	COM	461	(6)
Courses to complete major			(40–44)

OPTION COURSES FOR MAJOR

(Required in specific options)

ELECTRONIC BROADCASTING

Broadcast History	COM	204	(4)
Intro to the Film	COM	241	(4)
Intro to Broadcast Techniques	COM	242	(4)
News and Special Events	COM	301	(4)
Broadcast Regulation	COM	323	(4)
Intermed Broadcast Techniques	COM	342	(4)
TV and Radio News Analysis	COM	411	(4)
Documentary Film	COM	431	(4)
Writing/Producing for Broadcast Media	COM	444	(4)
or Television Directing	COM	434	(4)
Broadcast Media Criticism	COM	448	(4)

NEWSPAPER/MAGAZINE JOURNALISM

Reporting	COM	102	(4)
Reporting	COM	202	(4)
History of Mass Communications	COM	203	(4)
Communications Law	COM	304	(4)
Editing Laboratory	COM	305	(2)
In-Depth Reporting	COM	307	(4)
Reporting Public Affairs	COM	309	(4)
Editorial Writing	COM	310	(2)
Constitution and the Media	COM	322	(4)
Communications Ethics	COM	401	(4)
Public Opinion, Propaganda and Mass Media	COM	413	(4)

PUBLIC RELATIONS

Reporting	COM	102	(4)
Photography	COM	131	(4)
Advanced Reporting	COM	202	(4)
Principles of Printing	COM	206	(4)
Adv. Copy, Layout, & Prod.	COM	302	(4)
Communications Law	COM	304	(4)
Editing Laboratory	COM	305	(2)
Magazine Publishing	COM	312	(3)
Public Relations Theory	COM	313	(4)
Public Relations Techniques	COM	315	(4)
Public Relations Case Studies	COM	414	(4)

SPECIALIZED COMMUNICATION STUDIES

Language in Govt. & Industry	COM	320	(4)
Comm Problem Analysis	COM	321	(4)
Minimum of 16 units in COM/SP at least 8 must be lower division. Not to include any G.E. or other required and/or support and directed courses in COM/SP			(16)
Other courses at 300-400 level, university-wide, by contract with approval of adviser			(16)

ORGANIZATIONAL COMMUNICATION

Interpersonal	SP	103	(4)
Comm In Organization	COM	114	(4)
Oral Presentation	SP	201	(2)
Interviewing	SP	207	(2)
Small Group	SP	309	(4)
Human Comm Theory	SP	301	(4)

OR Org. Comm Theory	COM	314	(4)

(One Combination of the following)

General Communication

Argument & Advocacy	SP	204	(4)
Group Discussion	SP	307	(4)
Language in Government	COM	320	(4)
Comm Problem Analysis	COM	321	(4)
Process of Social Influence	SP	403	(4)

Applied Organizational Communication

Field Studies/Audits	COM	402	(4)
Intro Organizational Behavior	MHR	318	(4)
Statistics	BHS	307	(4)
Sem in Small Groups	BHS	407	(4)
Survey Research	SOC	433	(4)

Human Communication

Debate	SP	131	(2)
Argument & Advocacy	SP	204	(4)
Forensics Practice	SP	231	(2)
	SP	331	(2)

(Three of the following)

Speech Criticism	SP	308	(4)
American Public Address	SP	312	(4)
Modern Rhetorical Criticism	SP	408	(4)

Political Communication

American Public Address	SP	312	(4)
Survey of Rhetorical Theory	SP	316	(4)
Proc of Social Influence	SP	403	(4)
Public Opinion, Propaganda	COM	413	(4)

(Two of the following)

Political Parties	PLS	324	(4)
Intro Group Politics	PLS	325	(4)
Political Behavior	PLS	425	(4)
Amer. Dreams, Myths, & Realities	AMS	450	(4)

SUPPORT & ELECTIVE COURSES

(Required in specified options)

ELECTRONIC BROADCASTING

Reporting	COM	102	(4)
Communication in Organizations	COM	114	(4)
Photography	COM	131	(4)
Communications Law	COM	304	(4)
Communications Ethics	COM	401	(4)
Intro to Acting	DR	125	(3)
Basic Keyboarding or proficiency exam	MHR	144	(2)
Library and Bibliographical Techniques	LIB	103	(4)
Princ. of Psychology	PSY	202	(4)
Princ. of Economics	EC	201	(4)
Princ. of Economics	EC	202	(4)
Courses to Complete General Education			(72)
Unrestricted Electives			(29–31)

NEWSPAPER/MAGAZINE JOURNALISM

Photography	COM	131	(4)
Principles of Printing	COM	206	(4)
Photojournalism	COM	231	(2)
Newspaper Practices	COM	251	(6)
and/or Magazine Practices	COM	252	
and/or Advanced Newspaper Practices	COM	351	
and/or Advanced Magazine Practices	COM	352	
Newspaper Operations	COM	403	(4)
or Magazine Publishing	COM	312	(3)
Principles of Economics	EC	202	(4)
Public Finance	EC	301	(4)
or Money and Banking	EC	308	
Logic and Semantics	PH	202	(4)
Public Speaking	SP	100	(4)
Advanced Expository Writing	ENG	303	(4)
Basic Keyboarding or proficiency exam	MHR	144	(2)
Research Techniques in Political Science	PLS	205	(4)
or Methods in the Behavioral Sciences	BHS	204	
Courses to Complete General Education			(72)
Unrestricted Electives			(26–27)

PUBLIC RELATIONS

History of Mass Communication	COM	203	(4)
Intro Broadcast Techniques	COM	242	(4)
In-Depth Reporting	COM	307	(4)
Communication Problem Analysis	COM	321	(4)
Communication Ethics	COM	401	(4)
Pub Opin, Prop & Media	COM	413	(4)
Principles of Economics	EC	202	(4)
Freshman Composition	ENG	105	(4)
or Report Writing	COM	216	
Advanced Expository Writing	ENG	303	(4)
Basic Keyboarding or proficiency exam	MHR	144	(2)
Business & Its Environment	OM	103	(4)
Courses to Complete General Education			(72)
Unrestricted Electives			(29)

SPECIALIZED COMMUNICATION

Communication in Organizations	COM	114	(4)
Report Writing	COM	216	(4)
or Business Communication	COM	218	
or Technical Writing	COM	219	
Basic Keyboarding	MHR	144	(2)
Interpersonal Communications	SP	103	(4)
or Group Discussion	SP	307	
Courses to Complete General Education			(72)
Unrestricted Electives			(24–26)

ORGANIZATIONAL COMMUNICATION

Intro Cultural Anthropology	ANT	102	(4)
Prin of Econ	EC	202	(4)
Freshman Comp	ENG	105	(4)
or Report Writing	COM	216	
Prin of Psy	PSY	202	(4)
Mngt Prin Theory	OM	307	(4)
Basic Keyboarding or Proficiency Exam	MHR	144	(2)
Beh Sci Methods	BHS	204	(4)
Beh Sci Methods	BHS	205	(4)
or Intro Research Methods	PLS	205	(4)
Courses to Complete General Education			(72)
Unrestricted Electives			(42–44)

MINORS

May be taken by Communication Arts Majors (if in an area different than the option).

COMMUNICATIONS MINOR

Introduction to Communication Theory	COM	201	(4)
* Report Writing	COM	216	(4)
Introduction to the Film	COM	241	(4)
Communications Problem Analysis	COM	321	(4)
Public Speaking	SP	100	(4)

Should be 3 units see p.436

Select one of the following:

Photography	COM	131	(4)
Introduction to Broadcast Techniques	COM	242	(4)
Interpersonal Communication	SP	103	(4)
Advocacy and Argument	SP	204	(4)

Select one of the following:

Public Relations Theory	COM	313	(4)
Language in Government and Industry	COM	320	(4)
Human Communication Theory	SP	301	(4)

Select one of the following:

Communications Law	COM	304	(4)
Public Opinion, Propaganda and the Mass Media	COM	413	(4)
Process of Social Influence	SP	402	(4)
Total Units Required			(32)

* Completion of the University requirement of ENG 104 is a prerequisite for COM 216.

NEWSPAPER JOURNALISM MINOR

Introduction to Mass Communication	COM	101	(4)
Reporting	COM	102	(4)
Advanced Reporting	COM	202	(4)
History of Mass Communication	COM	203	(4)
Newspaper Practices	COM	251	(2)
or Advanced Newspaper Practices	COM	351	
Communications Law	COM	304	(4)
Reporting Public Affairs	COM	309	(4)
Communications Ethics	COM	401	(4)
or Public Opinion, Propaganda and the Mass Media	COM	413	
Basic Keyboarding	MHR	144	(2)
or permission of instructor for COM 102			
Total Units Required			(30–32)

PUBLIC RELATIONS MINOR

Introduction to Mass Communication	COM	101	(4)
Reporting	COM	102	(4)
* Report Writing	COM	216	(4)
Introduction to Broadcast Techniques	COM	242	(4)
In-Depth Reporting	COM	307	(4)
Public Relations Techniques	COM	311	(4)
Public Relations Theory	COM	313	(4)
Communications Problem Analysis	COM	321	(4)
or Public Relations Case Studies	COM	414	
Basic Keyboarding	MHR	144	(2)
or permission of instructor for COM 102			
Total Units Required			(32–34)

* Completion of the University requirement of ENG 104 is a prerequisite for COM 216.

SPEECH COMMUNICATION MINOR

Public Speaking	SP	100	(4)
or Interpersonal Communication	SP	103	
Advocacy and Argument	SP	204	(4)
Human Communication Theory	SP	301	(4)
Group Discussion	SP	307	(4)

Select two of the following:

Public Opinion, Propaganda and the Mass Media	COM	413	(4)
Small Group Communication	SP	309	(4)
Process of Social Influence	SP	403	(4)

Select two of the following:

Speech Criticism	SP	308	(4)
American Public Address	SP	312	(4)
Classical Rhetorical Theory	SP	316	(4)
Modern Rhetorical Theory	SP	317	(4)
Total Units Required			(32)

Course Descriptions

COM 101 Introduction to Mass Communications (4)

Survey of contemporary mass media; communications theory, structure and inter-relationships of newspapers, magazines, radio, and television. Analyses of major media content. 4 lectures.

COM 102 Reporting (4)

Basic news gathering and writing principles. Emphasis on style, sources, interviewing, news leads, and story development. 2 lectures, 2 two-hour activities. Prerequisites: COM 101, HSB 144 or typing proficiency certificate or permission of instructor.

COM 114 Written and Oral Communication in Organizations (4)

Composing effective oral and written messages within organizations, using professional communicators' methods and formats. 4 lecture-discussions.

COM 131 Photography (4)

Basic photography techniques, including taking, processing, and selecting good photos. For those with no or limited experience in photography. 2 lectures, 2 three-hour laboratories. Prerequisite: access to camera that uses 35mm, 120 or 620 film and has adjustable shutter speed, f/stop and focusing controls.

COM 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

COM 201 Introduction to Communication Theory (4)

Study of contributions of rhetorical theory, linguistics, psychology, and sociology to the development of general communication theory. 4 lectures. Prerequisite: sophomore standing or permission of instructor.

COM 202 Reporting (4)

Advanced news gathering, interviewing and writing principles. Emphasis on multisource interviews and stories, including documents and news features. 2 lectures, 2 two-hour activities. Prerequisites: COM 102, HST 144 or typing proficiency certificate.

COM 203 History of Mass Communications (4)

History, background, and responsibilities of the mass media. Emphasis on development of mass communication in the United States. 4 lectures.

COM 204 Broadcast History (4)

History and development of broadcast media. Emphasis on the American system. 4 lectures.

COM 206 Principles of Printing (4)

Printing processes and the adaptability and possibilities of each; preparation of material for printing. 4 lectures.

COM 216 Report Writing (4)

Report-writing techniques. Research, organization, and preparation of specialized and technical information. Regular written reports. 4 lecture-discussions. Prerequisite: ENG 104.

COM 218 Business Communication (4)

Writing effective business letters and memoranda with emphasis on clarity and on reaction-evoking techniques. Letters of application and resumes. 4 lecture-discussions. Prerequisite: ENG 104.

COM 219 Technical Writing (4)

The principles of technical writing with extensive practice in the preparation of technical materials in the various forms common to the engineering fields. 4 lecture-discussions. Prerequisite: ENG 104.

COM 231 Photojournalism (2)

Photography for publication and public relations. Photo editing, picture stories and illustrations, photo marketing. 1 lecture, 1 three-hour laboratory. Prerequisite: COM 131 or permission of instructor.

COM 241 Introduction to the Film (4)

The development of the motion picture as an art form and medium of mass communication. Critical appreciation and analysis of the film. 2 lectures, 2 two-hour activities.

COM 242 Introduction to Broadcast Techniques (4)

Introduction to broadcast studio production techniques, broadcast equipment, types of programming, and performance skills. 2 lectures, 2 three-hour laboratories.

COM 251 Newspaper Practices (2)

Newspaper production course for beginning staff members. Minimum of 6 hours of production activity a week. Total credit in COM 251, 252, 253, 254 limited to 6 units.

COM 252 Magazine Practices (2)

Magazine production course for beginning staff members; includes writing, layout, and production activity. Minimum of 4 hours activity a week. Prerequisite: permission of instructor. Total credit in COM 251, 252, 253, 254 limited to 6 units.

COM 253 Radio Practices (2)

Radio production experience for beginning broadcasting students. Minimum of 6 hours of production activity a week. Prerequisite: permission of instructor. Total credit in COM 251, 252, 253, 254 limited to 6 units.

COM 254 Television Practices (2)

Television production experience for broadcasting option students. Minimum of 6 hours of production activity a week. Prerequisites: COM 252, 342, and permission of instructor. Total credit in COM 251, 252, 253, 254 limited to 6 units.

COM 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

COM 301 News and Special Events (4)

Gathering, writing, and editing of news and special events materials for the broadcast media. Production of a weekly program for community and campus distribution. Experience in performance and production of news programs. 3 lectures; 1 three-hour laboratory. Prerequisites: COM 102 and 242.

COM 302 Advertising Copywriting, Layout and Production (4)

Examination of advertising appeals and application of product and market research to specific creative problems. Preparation of copy, planning of layout, and production of advertising. 2 lectures, 2 two-hour activities. Prerequisite: COM 206 or permission of instructor.

COM 304 Communications Law (4)

The fundamentals and applications of libel and right-of-privacy laws as they affect mass communication. 4 lectures. Prerequisite: COM 101 or permission of instructor.

COM 305 Editing Laboratory (2)

Copy editing, headline writing, layout, and makeup. 2 three-hour laboratories. Prerequisites: COM 102, 131, 206, 304, 307.

COM 307 In-Depth Reporting (4)

In-depth reporting principles and development, including investigative, interpretive, series, and personality stories. 2 lectures, 2 two-hour activities. Prerequisites: COM 102, 202.

COM 309 Reporting Public Affairs (4)

Gathering material and writing stories pertaining to business, labor, industry, government, and courts; emphasis on organization and procedure of government and courts. 2 lectures, 2 two-hour activities. Prerequisite: COM 102, 202.

COM 310 Editorial Writing (2)

Writing editorials; emphasis on the use of editorial comment. 2 lectures. Prerequisite: COM 102.

COM 312 Magazine Publishing (3)

Editing and production of magazines, including content, layout, design, photography, and advertising; analysis of various types of magazines, such as house organs, trade and specialized publications; legal problems. 3 lectures. Prerequisites: COM 102, 131, 206, 304, 305 and 307.

COM 313 Public Relations Theory (4)

The effects of organized information on public thinking; dissemination of ideas by commercial, industrial, social, and governmental organizations; the use of various publicity tools. 4 lectures. Prerequisite: ENG 105 or COM 216.

COM 314 Organizational Communication Theory (4)

Role of communications in organizations. Variables that affect communications in this environment. Study of skills, strategies, and tactics to improve overall organizational communications. 4 lecture-discussions.

COM 315 Public Relations Techniques (4)

The development and use of public relations tools, including press releases, public service announcements for radio and television, press kits, house organs, public relations programs. 4 lectures. Prerequisites: COM 102, 313.

COM 320 Language in Government and Industry (4)

Study of language and style in professional writing with a concentration on fundamental language components as they appear in written communications in government and industry. 4 lectures. Prerequisite: sophomore standing or permission of instructor.

COM 321 Communications Problem Analysis (4)

Analysis of breakdowns in communications systems; identification of barriers and constraints to effective message transmission. Emphasis on practical and creative problem solving. 4 lectures. Prerequisite: sophomore standing or permission of instructor.

COM 322 The Constitution and the Media (4)

Problems and practice of the media in such areas as freedom of the press, censorship, free press versus fair trial, contempt, media access to government information, newsman's freedom to travel, private access to the media. 4 lectures. Prerequisite: COM 304.

COM 323 Broadcast Regulation (4)

Problems and practices of broadcast media in a regulated environment. Technical and theoretical origins and development of regulation. Processes and conditions of regulation, theoretical and practical dilemmas, constitutional implications, and critique of regulatory processes and institutions. 4 lecture-discussions. Prerequisites: COM 101, 204, 304.

COM 324 Employment Applications and Resumes (3)

Researching the employment market, preparing a professional resume, and interviewing for employment positions; communication models; emphasis on individual adaptation of the student's background. 3 lectures. Prerequisite: ENG 105 or COM 114 or permission of instructor.

COM 331 Advanced Photographic Techniques (2)

Special photographic techniques for publication, illustration, and photo marketing. 1 lecture, 1 three-hour laboratory. Prerequisite: COM 131.

COM 342 Intermediate Broadcast Techniques (4)

Utilization of video and audio production skills in nondramatic and dramatic formats. Directing, producing, and scripting. 2 lectures, 2 three-hour laboratories. Prerequisite: COM 242.

COM 351 Advanced Newspaper Practices (2)

Newspaper production course for experienced staff members. Minimum of 6 hours of production activity a week. Prerequisite: permission of instructor. Total credit in COM 351, 352, 353, 354 limited to 6 units.

COM 352 Advanced Magazine Practices (2)

Magazine production course for experienced staff members; includes all phases of magazine production. Minimum of 4 hours activity a week. Prerequisite: permission of instructor. Total credit in COM 351, 352, 353, 354 limited to 6 units.

COM 353 Advanced Radio Practices (2)

Radio production experience for intermediate level broadcasting students. Minimum of 6 hours of production activity a week. Prerequisite: 2 units of COM 253 or permission of instructor. Total credit in COM 351, 352, 353, 354 limited to 6 units.

COM 354 Advanced Television Practices (2)

Television production course for experienced broadcasting option students. Minimum of 6 hours of production activity a week. Prerequisites: 2 units of COM 254 and permission of instructor. Total credit in COM 351, 352, 353, 354 limited to 6 units.

COM 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

COM 401 Communications Ethics (4)

Responsibility of the mass media and the journalist in today's society. 4 lectures. Prerequisite: COM 304.

COM 402 Communications Field Studies/Auditing (4)

Analysis of the methods and instruments available for the study of communication variables in organizations. 2 lectures, 2 three-hour laboratories. Prerequisites: COM 314.

COM 403 Newspaper Operations (4)

The organization of the newspaper, including study of advertising and circulation problems and relations with the community. 4 lectures. Prerequisites: COM 101 or permission of instructor.

COM 411 TV and Radio News Analysis (4)

Survey of principles and practices of interpretive reporting and commentary in electronic media; organization, writing, delivery of news analyses; production of commentary programs on news, leading to their use on radio and television stations. 2 lectures, 2 two-hour activities. Prerequisite: COM 102, 242, 301.

COM 413 Public Opinion, Propaganda and the Mass Media (4)

Critical study and evaluation of the techniques of psychopolitical persuasion, mass media and public opinion in America; developments in international propaganda. 4 lectures.

COM 414 Public Relations Case Studies (4)

Examination and analysis of current public relations practices and campaigns used by organizations, businesses, and institutions; development of public relations campaigns for specific situations. 4 lectures. Prerequisites: COM 311, 313.

COM 431 The Documentary Film (4)

Principles and techniques of the documentary film in mass communications. 2 lectures, 2 two-hour activities.

COM 432 Introduction to Film Production Techniques (4)

The fundamentals of film and sound in the super 8mm format. Scripting, producing, directing, and editing individual films. Camera and recorders supplied, but not film and processing. 2 lectures, 2 three-hour laboratories. Prerequisites: COM 242, 431; or permission of instructor.

COM 433 Intermediate Film Production Techniques

Group development of a treatment and shooting script. Individual responsibility for research, gathering sound, filming, and editing segments of a single color-sound film in 16mm format. Offered when grants are available. 2 lectures, 2 three-hour laboratories. Prerequisites: COM 242, 342, 432, 444.

COM 434 Television Directing (4)

Principles and practices of complex studio operations. Directing performers on television productions. Working with full scripts, sets, and makeup. The coordination of all factors in the full production of programs. 2 lectures, 2 three-hour laboratories. Prerequisites: DR 125, COM 342.

COM 442 Remote Broadcast Production (4)

The principles of remote broadcast utilizing a self-contained mobile van to program local and campus events and news. Directing the unpredictable, ad-libbing, and extensive video tape editing experience. Emphasis on a professional product to be distributed to campus and community. 2 lectures, 2 three-hour laboratories. Prerequisite: permission of instructor.

COM 444 Writing/Producing for Broadcast Media (4)

Introduction to requirements of writing for the broadcast media. Practice in development of treatment, rundown sheets, story board. Shooting script. Writing to film footage. 2 lectures, 2 three-hour laboratories. Prerequisites: ENG 104, COM 242, 342.

COM 445 Basic Color Photography (2)

Taking, processing, and printing color photographs. Emphasis on creative use of special effects achieved by unique lighting, films, and camera techniques directed toward expressive visual statement. 1 lecture, 1 three-hour laboratory. Prerequisite: COM 131 or permission of instructor.

COM 448 Broadcast Media Criticism (4)

Analysis and criticism of the broadcasting media. Examination of popular literature on the media and the study of selected programming to determine the state of the art. Writing critical analysis of current programs. 4 lectures. Prerequisite: permission of instructor.

COM 451 Editorial Newspaper Practices (2)

Newspaper production course for students in editorial and management positions. Minimum of 6 hours of production activity a week. Prerequisite: permission of instructor. Total credit in COM 451, 452, 453, 454 limited to 6 units.

COM 452 Editorial Magazine Practices (2)

Magazine production course for students in editorial and management positions. Minimum of 4 hours activity a week. Prerequisite: permission of instructor. Total credit in COM 451, 452, 453, 454 limited to 6 units.

COM 453 Managerial Radio Practices (2)

Radio production course for students in management positions. Minimum of 6 hours of production activity a week. Prerequisites: 2 units of COM 353 and permission of instructor. Total credit in COM 451, 452, 453, 454 limited to 6 units.

COM 454 Managerial Television Practices (2)

Television production course for students in management positions. Minimum of 6 hours of production activity a week. Prerequisites: 2 units of COM 354, 434, and permission of instructor. Total credit in COM 451, 452, 453, 454 limited to 6 units.

COM 461 Applied Communication (2–6)

An intensive communications internship or other individual/group study of the communications process as specified by each option. Total credit required 6 units, with 2-6 units per quarter. Maximum of 6 units.

COM 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

Speech Communication

Sp 100 Public Speaking (4)

Theory and practice of speech organization, composition, and delivery. Use of research materials. 4 lecture-participations.

SP 103 Interpersonal Communication (4)

An introduction to the variables determining communication behavior. Development of understanding through involvement in a variety of structured face-to-face interactions with other students. 4 lecture-participations.

SP 131 Debate (2)

Introduction to reasoning and argument through formal debate. Selection and phrasing of a proposition, formal structure of a debate, gathering and testing of evidence, construction of cases, and skills of refutation which are developed by debating. 2 lecture-participations.

SP 201 Oral Presentations (2)

Introduction to the methods of oral presentation utilized in business and professional settings. Theory and actual practice in performing briefings, and presentations using a variety of media. 2 lecture-discussions.

SP 204 Advocacy and Argument (4)

An investigation into logical methods of proof and different modes of advocacy. Argument as measured by formal validity and rhetorical effectiveness. Principles of argumentation with application of contemporary forms of public advocacy. 4 lecture-participations.

SP 207 Interviewing: Principles and Techniques (2)

Introduction to the principles, techniques, and practices of interviewing as conducted in business, community, and media settings; theory and application of techniques. 2 lecture-discussions.

SP 231 Forensics Practices (2)

Intercollegiate and intramural competition in debate, persuasive speaking, oral interpretation, and other competition events. Independent projects in specialized fields. Minimum 6 hours activity. May be repeated for up to 6 units.

SP 301 Human Communication Theory (4)

An interdisciplinary, behaviorally oriented examination of the constituent processes of human communication. 4 lectures. Prerequisite: SP 100 or SP 204 or permission of instructor.

SP 305 Communication in the Classroom (2)

The role of communication in the classroom; its methods and techniques; an analysis of the centrality of communication as a means of education. 2 lecture-discussions.

SP 307 Group Discussion (4)

Variables of communication within problem-solving groups; development of conference and discussion skills. Secondary emphasis on group psychology as it relates to problem-solving discussions. 4 lecture-participations.

SP 308 Speech Criticism (4)

Critical approaches to the analysis and evaluation of contemporary speeches. Development of traditional evaluative standards and methods of criticism; emphasis on the internal aspects of speech criticism. 4 lecture-discussions. Prerequisite: permission of instructor.

SP 309 Small Group Communication (4)

The structure and process of small groups as related to forces at work in problem-solving interaction. The study of related theory and research. 4 lecture-discussions. Prerequisite: SP 307 or PSY 314.

SP 312 American Public Address (4)

Techniques and strategies of major speeches affecting significant political, social, and religious issues in the United States between 1750 and 1950. Important trends in public address and events. 4 lectures. Prerequisite: junior standing or permission of instructor.

SP 316 Survey of Rhetorical Theory (4)

Major issues in the theories of rhetoric; analysis of the philosophical issues of rhetoric as viewed through original and critical sources. 4 lectures.

SP 331 Forensics Practices (2)

Intercollegiate and intramural competition in debate, persuasive speaking, oral interpretation, and other competition events. Independent projects in specialized fields. Minimum 6 hours activity. May be repeated for up to 6 units.

SP 403 Process of Social Influence (4)

Analysis of persuasion in American society. The study of theory and research findings related to the process of social influence. 4 lecture-discussions. Prerequisite: SP 100 or 103 or permission of instructor.

SP 408 Modern Rhetorical Criticism (4)

Theoretical and critical approaches to the analysis, explanation, and evaluation of rhetorical acts and movements. 4 lecture-discussions. Prerequisite: SP 308 or permission of instructor.

SP 431 Forensics Practices (2)

Experience in directing forensics activities and preparing other students for speaking events. Minimum 6 hours activity. May be repeated for a maximum of 6 units. Prerequisite: permission of instructor.

DRAMA

Robert L. Gilbert, *Chair*

James L. Martin Edward M. Pinson Leslie Rivers

The basis of the program leading to the bachelor of arts degree is the understanding of drama as a creative art through two media—active student participation in theatre productions aimed at a mastery of skills in all aspects of theatre, and a comprehensive study of drama.

To provide for the active participation of students, a wide range of student productions is presented. Students receive intensive training in the theory and skills of acting, directing, stagecraft, makeup, stage lighting, costume and scene design, and stage management.

Experimental workshops explore new trends in drama and its production. These workshops and the major productions involve students from a variety of academic disciplines, and contribute greatly to the cultural climate of the university and of the local communities.

Course work includes theatre history and criticism, playwriting, dramatic structure, and dramatic literature. The curriculum develops the academic background essential to intelligent and relevant integration of production skills of contemporary society with their antecedents in the great classic dramatic periods of the past.

After completing the drama program at Cal Poly, students are prepared to go into teaching in secondary schools; into graduate schools; or into specialized training for professional theatre, television, or motion pictures.

The Drama minor is designed to acquaint a person interested in pursuing theatre on a limited scale with the basic tools for mounting a production, whether in a school or community theatre situation. It also accommodates those who may wish to begin a specialization in the acting-directing or the technical train. The program is one of both classroom participation and practical experience in the production program. Special advisement for students who are interested in drama may be obtained from the department chairman. Detailed information is available from the departmental office.

CORE COURSES FOR MAJOR

(Required of all students)

Technical Production	DR	131	(4)
Technical Production	DR	132	(4)
Makeup	DR	143	(1)
Acting	DR	151	(4)
Acting	DR	152	(4)
Movement for the Stage	DR	254	(2)
History of the Theatre	DR	311	(4)
History of the Theatre	DR	312	(4)
History of the Theatre	DR	313	(4)
Stage Lighting	DR	332	(3)
Directing	DR	356	(4)
Seminar in Theatre History	DR	414	(2)
Senior Project	DR	461	(2)
Senior Project	DR	462	(2)
Undergraduate Seminar	DR	463	(2)
Electives chosen from the following courses with the approval of advisor			(17)
Applied Drama (DR 170 series)*			(2)
Intro to Amer Theatre	DR	210	(4)
Drafting for Theatre	DR	233	(3)
Vocal Techniques	DR	252	(3)
Intermediate Acting	DR	253	(4)
Movement for the Stage	DR	254	(2)
Black Theatre	DR	302	(3)
Scene Design	DR	337	(4)
Improvisation for the Theatre	DR	355	(2)
Reader's Theatre	DR	358	(3)
Theatre Management	DR	361	(4)
Applied Drama (DR 370 series)*			(2)
Stage Costume Design and Construction	DR	381	(4)
Playwriting	DR	401	(4)
Seminar in Theatre History	DR	414	(2)
Advanced Acting	DR	458	(4)
Creative Drama	DR	471	(4)
History of Costume	DR	481	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Intro to the Theatre	DR	203	(4)
Play Production Activity	DR	244 **	(6)
Advanced Projects in Theatre	DR	441 **	(6)
Freshman Composition	ENG	104	(4)
Freshman Composition	ENG	105	(4)
Advocacy and Argument	SP	204	(4)
Western Literary Heritage	ENG	217	(4)
or Western Literary Heritage	ENG	218	
Introduction to Shakespeare	ENG	203	(4)
or Shakespeare	ENG	403	
History of Civilization	HST	101	(4)
or History of Civilization	HST	102	
Music course			(4)
Art course			(4)
Courses to Complete General Education Requirements			(40)
Free Electives			†(26)

* No more than 8 units may be selected from these courses for the major.

** Drama majors are required to take one unit of either DR 244 or 441 per quarter.

† The total curriculum must include 60 units of upper division courses.

DRAMA MINOR

Required lower-division courses: 16 units

Technical Production	DR	131	(4)
Technical Production	DR	132	(4)
Acting	DR	151	(4)
Modern Theatre Practice	DR	204	(4)

Required upper-division courses: 8 units

Advanced Projects in Theatre (4 separate quarters)	DR	441	(4)

History of the Theatre	DR	311	(4)
or History of the Theatre	DR	312	
or History of the Theatre	DR	313	

Choose 8 units from one of the following two groups:

1. Directing—Acting

Intermediate Acting	DR	253	(4)
Directing	DR	356	(4)
or Advanced Acting	DR	458	

2. Technical Theatre

Stage Lighting	DR	332	(3)
Scene Design	DR	337	(4)
Make-up	DR	143	(1)
Total units required in the minor			(32)

Course Descriptions

DR 125 Introduction to Acting (4)

Introduction to theories and approaches to acting through participation. Intensive exercises in improvisation, characterization, concentration, and interpretation. Intended primarily for non-majors. 2 lectures-discussions plus 2 two-hour activities. May be repeated once for credit.

DR 131 Technical Production (4)

Principles of backstage organization, scenery construction, and painting. Crew work on current productions. 2 lectures, 2 two-hour activities.

DR 132 Technical Production (4)

Principles and techniques of stage lighting and sound. Crew work on current productions. 2 lectures, 2 two-hour activities.

DR 143 Makeup (1)

Theory and practice in theatrical makeup, including materials, base and lining techniques, chiaroscuro, old age and character makeup, construction of life masks, construction and application of appliances. 1 three-hour laboratory.

DR 151 Acting (4)

Theory and practice of acting with special attention to basic approaches, including improvisation, motivation, concentration, and character development. 2 lectures, 2 three-hour laboratories. May be repeated once for credit by permission of instructor.

DR 152 Acting (4)

Theory and practice of acting, to refine and expand upon basic acting skills through improvisation and scene theory. Prerequisite: DR 151 or consent of instructor.

DR 170, 370 Applied Drama (2) (2)

A series of specialized individual instruction for drama majors in primary performance disciplines as listed below. A minimum of 10 hours of tutorial guidance for 2 units of credit. Prerequisite: permission of instructor. May be repeated for credit, by permission of instructor.

DR 171, 371 Applied Acting

DR 172, 372 Applied Directing

DR 173, 373 Applied Movement

DR 174, 374 Applied Voice

DR 175, 375 Applied Lighting

DR 176, 376 Applied Design

DR 177, 377 Applied Scene Painting

DR 178, 378 Applied Publicity and House Management

DR 179, 379 Applied Sound

DR 180, 380 Applied Makeup

DR 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

DR 203 Introduction to the Theatre (4)

Theatre as a performing art. The study of representative plays as they illustrate questions of structure and interpretation as well as elements of theatre production and management. 4 lecture-discussions. Prerequisite: ENG 104 or permission of instructor.

DR 210 Introduction to American Theatre (4)

Readings chiefly in the 20th century with emphasis upon such representative playwrights as O'Neill, Odets, Rice, Kaufman, Anderson, Williams, Miller, Albee, Hansberry, Hellman, Mamet, Guare, and Wilson. Examination of production styles and cultural patterns. 4 lecture-discussions.

DR 233 Drafting for the Theatre (3)

Theatrical drafting techniques, including ground plans, elevations, working drawings, isometrics, cabinet views. Design breakdown and scenery planning. Two 1-hour lectures, one 2-hour activity. Prerequisite: DR 131 or permission of instructor.

DR 244 Play Production Activity (1-2)

Practical experience by participation in theatrical production. Technical crews, theatre management and acting. 4 hours laboratory. May be repeated for not more than 12 units.

DR 252 Vocal Techniques for the Theatre (3)

Principles of the actor's vocal techniques for theatre performance; analysis of dialogue, its phonetic elements, rhythms, and regional variations; application of phonetic principles of articulation and pronunciation of stage dialogue; exercises for public performance; invitational public performance. 2 lecture-discussions, 1 two-hour activity.

DR 253 Intermediate Acting (4)

Techniques of play and scene analysis through class exercises in improvisation, formal analytical methods, and rehearsal techniques. Creation of roles for class and/or public performance. 2 lecture-discussions, 2 three-hour laboratories. Prerequisite: DR 151. May be repeated once for credit by permission of instructor.

DR 254 Movement for the Stage (2)

Exercises in sensory-motor awareness that lead to flexibility and coordination of the body in relation to the stage space that an actor must adapt to and occupy. 2 three-hour laboratories. May be repeated once for credit, by permission of instructor.

DR 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

DR 302 Black Theatre (3)

A survey of Black theatre history, beginning with its American origins. Emphasis on the Harlem Renaissance and the advent of Black revolutionary theatre. Performance techniques for workshop. 2 lecture-discussions, 1 two-hour activity.

DR 311 History of the Theatre (4)

Survey of dramatic art and production from the Greeks to 1640. Application of historic principles and styles to contemporary play production and criticism. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

DR 312 History of the Theatre (4)

Dramatic art and theatre production from 1640 to 1870. Application of theories, principles, and styles to contemporary play production and criticism. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

DR 313 History of the Theatre (4)

Survey of dramatic art and production from 1870 to the present. Application of historic principles and styles to contemporary play production and criticism. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

DR 332 Stage Lighting (3)

Theory and practice in stage lighting. Composition, design, switchboard design, instrument selection and purchasing, production planning. Participation as crew members and supervisors for departmental productions. 2 lectures, 1 three-hour laboratory. Prerequisite: DR 132 or permission of instructor.

DR 337 Scene Design (4)

Theory and technique for scene design, including working drawings, perspectives, painter's elevations, and ground plans. Techniques of scenery construction and painting. 2 lectures, 2 two-hour activities. Prerequisite: DR 131, 233, or permission of instructor. May be repeated once for credit by permission of instructor.

DR 355 Improvisation for the Theatre (2)

An approach to acting utilizing improvisational techniques to explore temporal, spatial, and sonoric relationships as well as scene-building methods. 2 three-hour laboratories. Prerequisite: DR 151. Offered in alternate years. May be repeated once for credit by permission of instructor.

DR 356 Directing (4)

Theory and practice of play selection, analysis and direction, composition, movement, coaching, and ground plans. 2 lecture-discussions, 2 three-hour laboratories. Prerequisite: DR 151, 253, or permission of instructor.

DR 358 Reader's Theatre (3)

Theory and directed practice in group presentation of dramatic and choral readings for public performance. Adaptation for group presentation of selected genres of literature including prose, verse, and drama. 1 lecture-discussion, 2 two-hour activities. May be repeated once for credit by permission of instructor.

DR 361 Theatre Management (4)

Principles of organization and management of the performing arts production program, including choice of season, audience analysis, promotion and publicity, box office procedures, budgeting and finance and crew organization and supervision. 3 lecture-discussions, 1 three-hour laboratory. Prerequisites: DR 131, 133, or permission of instructor.

DR 381 Stage Costume Design and Construction (4)

Design and construction of stage costumes including sketches, material selection, pattern drafting, cutting, fitting, sewing. 2 lectures, 2 two-hour activities.

DR 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

DR 401 Playwriting and Dramatic Structure (4)

Intensive study of dramatic structure as applied to theatre practice. Theory and practice in playwriting and criticism. 4 lecture-discussions. May be repeated once for credit by permission of instructor.

DR 414 Seminar in Theatre History (2)

Studies in a limited aspect of theatre history. Significant periods, modes, and contributors to the mainstream of theatrical arts. Subject matter to be announced each quarter that the course is offered. May be repeated for a total of 6 units. 2 lecture-discussions. Prerequisite: junior standing.

DR 420 Summer Theatre Production (6-12)

Preparation, rehearsal, and public performance of university-sponsored productions in an organized summer theatre similar to a professional stock company. Full-time work in all phases of production. By contract, 40 hours per week, earning 12 units; by contract, 20 hours per week, earning 6 units.

DR 441 Advanced Projects in Theatre (1-2)

Advanced problems and independent projects in acting, directing, stage design, stage lighting, costuming and staging, including participation in major productions and independent production of experimental student plays. Minimum of 4 hours laboratory. May be repeated for not more than 12 units.

DR 458 Advanced Acting (4)

Intensive study in styles and forms of acting, with special attention to mastery of technique and comparative study of theories of acting. 2 lectures, 2 three-hour laboratories. Prerequisites: DR 151, 253. May be repeated once for credit by permission of instructor.

DR 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems the graduate will meet in his/her chosen field of employment. Results presented in a formal written report. Minimum of 120 hours of total time.

DR 463 Undergraduate Seminar (2)

Reports of senior projects, discussions of professional articles of an appropriate level. 2 lecture-discussions.

DR 471 Creative Drama (4)

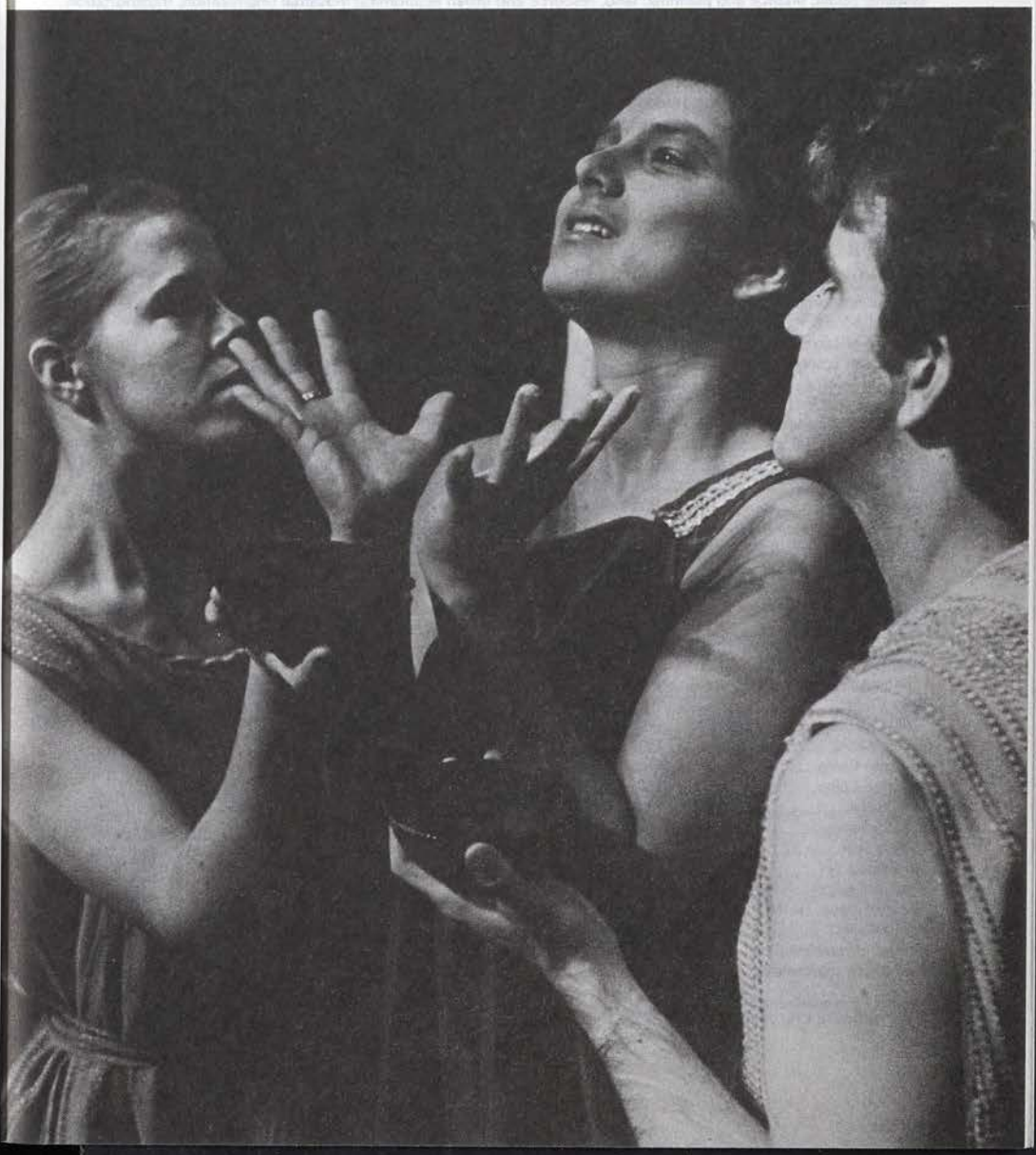
Theory and practice of improvisational drama, dramatization of children's stories, and techniques of story telling, with emphasis on participation, leadership, and development or original materials for classroom and recreational use. 2 lectures, 2 two-hour activities.

DR 481 History of Costume (4)

The dress of civilized man as applied to theatre costuming from early recorded history to the present, as seen through the contemporary art and written description, with emphasis on art history and social institutions. 4 lectures.

DR 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory or a combination of both.



ECONOMICS

John T. Shieh, *Chair*

Taha Al-Sabea
Sidney M. Blumner
Gertrude C. Boland
Robert T. Bray
George T. Galbreath
Franklin Y. H. Ho
Ralph B. Hutchinson
David G. Jaques
David J. Park
Milton M. Shapiro
Dale G. Stallings
James E. Sutton

The department serves all schools of the university by providing courses that contribute to the general education of all students and develop vocational proficiencies to meet the needs of the undergraduate economics majors. A curriculum leading to the master of science degree in economics is also offered in the department. Requirements for this degree may be found in the graduate listings.

The curriculum in economics, while offering a broad background of general education and traditional undergraduate courses, lends itself to considerable flexibility. Students consult with a faculty advisor to select courses suitable for a program relevant to personal goals. Nine possible areas of concentration are: international trade and development; economic history and comparative systems; labor and manpower economics; econometrics and systems; public finance and planning; land, resource and urban economics; industrial organization, transportation and public utilities; economics and social welfare; and economic projecting and planning.

The undergraduate major in economics has three objectives: first, to prepare economic analysts for positions in business, industry, agriculture, and government; second, to prepare students for research or management trainee positions in fields such as public administration, labor unions, industry, finance, and insurance; third, to furnish undergraduate preparation for students who may wish to pursue graduate work in the field of economics.

The minor in economics serves other departments of the university by providing their students with a well defined and generally recognized set of courses. For many majors the minor will enhance their employability upon graduation. It will also provide a structure for those seeking basic understanding of economic theory and its application. For others it will facilitate their graduate work.

CORE COURSES FOR MAJOR

(Required of all students)

Financial Accounting	ACC	124	(4)
Financial Accounting	ACC	125	(4)
Principles of Economics	EC	201	(4)
Principles of Economics	EC	202	(4)
Money & Banking	EC	308	(4)
Intermed Micro Theory	EC	311	(4)
Distribution of Income	EC	312	(4)
Intermed Macro Theory	EC	313	(4)
Economic Statistics	EC	321	(4)
Economic Statistics	EC	322	(4)
Senior Seminar	EC	462	(4)
Senior Seminar	EC	463	(4)
Adv Econ and/or Math Electives			(28)

SUPPORT & ELECTIVE COURSES

(Required of all students)

Amer Civiliz	AMC	201*	(4)
or Int Amer Govt	PLS	201*	
Amer Civiliz	AMC	202*	(4)
or U.S. History	HST	202*	
Report Writing	COM	216	(4)
Freshman Comp	ENG	104*	(4)
Freshman Comp	ENG	105	(4)
Intro to Stat	STA	107*	(4)
Public Speaking	SP	100*	(4)
Logic & Sem	PHL	202*	(4)
Intr Comput Sys	CIS	110*	(4)
or Intr Comput	CS	101*	
Non-core Upper Div EC *			(4)
PE, 100-Series†			(2)
Courses to complete Gen. Education requirements			(40)

* Fulfills GE requirement.
† Not required if CPU 201 (Category V of G.E.) is taken.

ECONOMICS MINOR

Principles of Economics	EC	201	(4)
Principles of Economics	EC	202	(4)
Money and Banking	EC	308	(4)
Intermediate Microeconomic Theory	EC	311	(4)
Distribution of Income and Factor Pricing	EC	312	(4)
Intermediate Macroeconomic Theory	EC	313	(4)

The student must also select 8 units from the following:

Public Finance	EC	301	(4)
Economic Statistics (Prerequisite: MAT 107)	EC	321	(4)
Economic Statistics (Prerequisite: MAT 107)	EC	322	(4)
Economic Development	EC	402	(4)
Comparative Economic Systems	EC	403	(4)
International Trade	EC	404	(4)
International Finance (Prerequisite: EC 404)	EC	405	(4)
Development of Economic Doctrine	EC	407	(4)
Economic History of Europe	EC	408	(4)
Economic History of the U.S.	EC	409	(4)
Managerial Economics	EC	413	(4)
Labor Economics	EC	414	(4)
Labor Problems and Practices	EC	415	(4)
Manpower Economics	EC	416	(4)
Land Economics	EC	419	(4)
Econometrics (Prerequisite: EC 321, 322)	EC	421	(4)
Economic Programming	EC	422	(4)
Economic Conditions Analysis	EC	423	(4)
Economic Planning	EC	426	(4)
State and Local Government Finance	EC	430	(4)
Regional Economic Analysis	EC	431	(4)
Urban Economics	EC	432	(4)
Economics of Transportation	EC	433	(4)

Economics of Public Utilities	EC	434	(4)
Environmental and Resource Economics	EC	435	(4)
Economics of Social Welfare	EC	437	(4)
Business and Government	EC	440	(4)
American Industry	EC	441	(4)
Economics of Capital Markets	EC	450	(4)
Planning-Programming, Budgeting System	EC	478	(4)
Economics of Minority Groups	EC	497	(4)
Total units required in minor			(32)

Course Descriptions

EC 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

EC 201 Principles of Economics (4)

Introduction to microeconomics. How an economic system works to solve the problems of choice among alternative allocations, utilizations, and distributions of resources. Applications of economic principles to domestic and international economic problems. 4 lecture-discussions.

EC 202 Principles of Economics (4)

Introduction to macroeconomics. Determinants of national income, output, employment, and price levels. Monetary and fiscal policy. International economics. Applications of economic principles to domestic and international economic problems. 4 lecture-discussions.

EC 205 Consumer Economics (4)

Principles of personal finance. The basic economics of personal money management, including budgeting, borrowing, spending, saving, investing, and insuring. 4 lecture-discussions. Prerequisite: EC 201 or EC 202.

EC 213 Economic Problems (4)

Specific current economic problems selected with reference to the needs of the students. 4 seminar-discussions. Prerequisite: EC 201, EC 202.

EC 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

EC 301 Public Finance (4)

Principles of government financing and its various economic and social effects; collecting, spending, and administration of public funds. 4 lecture-discussions. Prerequisite: EC 202.

EC 308 Money and Banking (4)

Relation of money and banking to the general economy; interrelationships between money and banking, production and distribution. 4 lecture-discussions. Prerequisite: EC 202.

EC 311 Intermediate Microeconomic Theory (4)

Role of prices in final output markets; principles of production; business behavior under various types of market conditions. 4 lecture, problem-solving sessions. Prerequisite: EC 201.

EC 312 Distribution of Income and Factor Pricing (4)

Theory of the functional and personal distribution of income. Determination of wages, rent, interest, and profits under various market conditions. 4 lecture, problem-solving sessions. Prerequisite: EC 311.

EC 313 Intermediate Macroeconomic Theory (4)

Determination of, growth, and fluctuations in national income; effects of consumers, firms, and government decisions on employment and price levels. 4 lecture, problem-solving sessions. Prerequisite: EC 202.

EC 321, 322 Economic Statistics (4) (4)

Statistical methods and techniques in economic analysis. Analysis of time series, index number construction, regression and correlation analysis, probability and other statistical distributions; related economic topics. 4 problem-solving sessions. Prerequisite: MAT 107 or an equivalent MAT statistics course.

EC 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

EC 401 Introduction to Mathematical Economics (4)

Mathematical description and derivation of micro- and macro-economic theory. 4 hours lecture-discussion. Prerequisites: EC 201, 202.

EC 402 Economic Development (4)

Preconditions and processes of economic growth and development of nations. Analysis in terms of economic theory. History and experience of societies relevant to problems of today's developing nations. 4 lecture-discussions. Prerequisite: EC 202 or permission of instructor.

EC 403 Comparative Economic Systems (4)

Examination of alternative economic organizations, ranging from free enterprise to fully planned economies. 4 lecture-discussions. Prerequisite: EC 201 or EC 202.

EC 404 International Trade Theory and Policy (4)

Topics in the theory of international trade and values. Theory of tariffs and quotas. 4 lecture-discussions. Prerequisite: EC 201, EC 202, or permission of instructor.

EC 405 International Finance (4)

Topics in international liquidity and finance theory. Problems of the international monetary system. 4 lecture-discussions. Prerequisite: EC 404 or permission of instructor.

EC 407 Development of Economic Doctrine (4)

The development of economic ideas and doctrines from the early Greek writers through the classical and neoclassical schools to the present. 4 lecture-schools to the present. 4 lecture-discussions. Prerequisite: EC 201, EC 202, or permission of instructor.

EC 408 Economic History of Europe (4)

Economic development of Europe from the fall of the Roman Empire to the formation of the Common Market; growth of economic institutions antecedent to those of modern Europe. Bearing of European economic development upon that of the United States. 4 lecture-discussions. Prerequisite: EC 201, EC 202, or permission of instructor.

EC 409 Economic History of the U.S. (4)

Analysis of growth and economic well-being of the U.S. economy in historical perspective. Interplay of economic forces and historical conditions. 4 lecture-discussions. Prerequisite: EC 201, EC 202, or permission of instructor.

EC 413 Managerial Economics (4)

Use of quantitative economic analysis in formulating business policies; analysis of the social impact of management's role in the economy; integrated application of economic and operations analysis to practical managerial problems. 4 lecture-discussions. Prerequisite: EC 201, EC 202, or permission of instructor.

EC 414 Labor Economics (4)

The structure of labor markets. The influence of unionism on income distribution. Effects of collective bargaining on economic welfare and efficiency. Government policy's role in the labor market. Job and union security under changing economic institutions. 4 lecture-discussions. Prerequisite: EC 202.

EC 415 Labor Problems and Practices (4)

Nature, instrumentalities, and structure of collective bargaining emphasizing three critical areas: labor management laws, grievance and arbitration procedures, and trends in collective bargaining. 4 seminar-discussions. Prerequisite: EC 414.

EC 416 Manpower Economics (4)

Analysis of wage-price stabilization programs. Integration of traditional labor approach with macro-model constraints. Economics of health and education in human resources approaches. Manpower planning techniques and limitations. Labor mobility and Phillips curve analysis. 4 lecture-discussions. Prerequisites: EC 201, 202.

EC 419 Land Economics (4)

Economic principles underlying utilization and conservation of land resources. Economics of urban land uses, forces of demand for urban land and factors affecting economic supply of urban land, factors affecting the locations of industries and other enterprises; patterns of urban and regional growth. Problems of rural and urban land use and development. More efficient uses of land and land-use planning. 4 lecture-discussions. Prerequisite: EC 201, EC 202, or permission of instructor.

EC 421 Econometrics (4)

Introduction to quantitative model building, estimation, verification, and prediction of economic variables. 4 lectures, problem-solving sessions. Prerequisites: EC 321, 322, or equivalent.

EC 422 Economic Programming (4)

Optimization analysis and programming techniques including various methods of programming: linear, integer, quadratic, and dynamic. 4 problem-solving sessions. Prerequisites: EC 202 and permission of instructor.

EC 423 Economic Conditions Analysis (4)

Techniques and procedures of statistical analysis of macroeconomic and microeconomic conditions. 4 problem-solving sessions. Prerequisite: EC 421.

EC 426 Economic Planning (4)

Theory and practice of economic planning ranging from national and regional economics to individual sectors, projects or enterprises; from the economies of market systems to comprehensive, all-encompassing plans. 4 lecture-discussions. Prerequisite: EC 201 or permission of instructor.

EC 430 State and Local Government Finance (4)

Theory and practice of state and local government finance. Examination of the impact of state and local government finance upon various sectors of state and local economy, and problems of fiscal federalism. 4 lecture-discussions. Prerequisite: EC 301.

EC 431 Regional Economic Analysis (4)

Theories and techniques of regional analysis: population estimation, income and social accounting, location theories, economic-base theory, input-output analysis; industrial complex analysis, interregional linear programming. 4 lecture-discussions. Prerequisite: EC 201, EC 202, or permission of instructor.

EC 432 Urban Economics (4)

Analysis of the level, distribution, and stability of local income; analysis of economic development of Southern California cities facing physical distribution and urban transportation problems; central business districts and urban renewal. 4 lecture-discussions. Prerequisite: EC 201, EC 202, or permission of instructor.

EC 433 Economics of Transportation (4)

The economic characteristics of transport; the functions of the differing transportation agencies; transportation pricing; problems of state and federal regulation; coordination of facilities; current transport problems. 4 lecture-discussions. Prerequisite: EC 201, EC 202, or permission of instructor.

EC 434 Economics of Public Utilities (4)

Economics of public service corporations. Problems of rate determination and other regulations. State and national problems arising from the development of public utilities. 4 lecture-discussions. Prerequisite: EC 201, EC 202, or permission of instructor.

EC 435 Environmental and Resource Economics (4)

Price system and efficiency in the use and conservation of natural resources; private and social costs; concept of waste; cost allocation among uses; analysis of policies for petroleum, coal, timber, fisheries, natural gas, and minerals. 4 lecture-discussions. Prerequisite: EC 201, EC 202, or permission of instructor.

EC 437 Economics of Social Welfare (4)

Economic security and social welfare. Sources, changes in, and attempts at alleviation of economic insecurity. Economics of Social Security, public assistance, and poverty programs. 4 lecture-discussions. Prerequisite: EC 202.

EC 440 Business and Government (4)

Economic significance of controls placed by government upon business; divergent issues arising from present relations of government to business. 4 lecture-discussions. Prerequisite: EC 201, EC 202, or permission of instructor.

EC 441 American Industry (4)

Examination of number and size distribution of sellers in selected American industries. Conduct and performance of firms in the context of the industry structure. Examination of actual and optimal government policy in each industry. 4 lecture-discussions. Prerequisite: EC 201, EC 202, or permission of instructor.

EC 450 Economics of Capital Markets (4)

The economic foundations of money and capital market transactions. Institutional and economic factors influencing the prices, uses, and sources of the flow of funds in equity and debt markets. 4 lecture-discussions. Prerequisites: EC 201, EC 202, 308.

EC 462, 463 Senior Seminar (4) (4)

Intensive study of the pragmatic applications of the various techniques of economic analysis across various intra-economics subject areas. 4 seminar-discussions. Prerequisite: permission of instructor.

EC 478 Budgeting Systems (4)

Economic analysis for decision-making in resource allocation in the absence of the market mechanism. The application of cost benefit analysis to public sector budget making, and a consideration of alternative public sector budget making procedures. 4 lecture-discussions. Prerequisite: EC 201.

EC 497 Economics of Minority Groups (4)

Economic analysis of the problems of minorities in the urban communities. Distribution and stability of minority income. Economic effects of discrimination. Federal, state, and local programs. Alternative solutions to present problems. 4 lecture-discussions. Prerequisite: EC 202.

EC 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

Graduate courses are listed in the graduate section of this catalog.

ENGLISH AND FOREIGN LANGUAGES

Harold P. Levitt, *Chair*

Samuel I. Bellman	Carol R. Hoder	Ben Siegel
Leo W. Berg	Theodore C. Humphrey	Mary Sisney
Alexander H. Chorney	Carola M. Kaplan	George Stavros
Stanley J. Cook	William McAdams	Joseph H. Stodder
Thomas J. Elliott	Caryl McNees	Richard W. Suter
Joseph R. Farrell	Ahmed M. Metwalli	Halsey P. Taylor
John F. Fulbeck	Robert E. Mosberger	Frank I. Torres
Barbara I. Gill-Mayberry	Victor N. Okada	Stephen V. Whaley
Trinidad Gonzalez	Andrew Moss	Elizabeth Whalley
Ruth M. Harmer	Larry K. Robinson	Lillian Wilds
Susana Hernandez-Araico	Sidney Shrager	Rudolph Zrimc

The major in English, which leads to the bachelor of arts degree, offers intensive study in the language and literature of both Britain and the United States. It encourages students not only to improve verbal skills, but to develop a fuller understanding of themselves and their culture. Graduates are prepared to enter a fifth-year program for a teaching credential or degree work in English, American studies, or related areas. Additional opportunities exist in law, business management, journalism, and other fields welcoming those with a liberal education.

The curriculum for the English major is patterned as follows: in the freshman year courses in the methods of reading literature and in the literature of Western antiquity; in the sophomore year a broad survey of English and American literature; in the junior year a narrower consideration of the principal genres; and in the senior year relatively intensive work in individual authors and pairs or small groups of authors.

In addition, the department lists elementary and intermediate sequences in French, German, and Spanish language and culture. Courses in English composition and literature serve the general university community. These include study in English as a second language and in the literature-language aspects of Black, Chicano, and American Indian Studies.

A minor in Spanish language and culture is intended to prepare students to communicate in Spanish, to appreciate more fully the cultural heritage of the Southwest, and to communicate more effectively with increasing Hispanic populations. Employment possibilities in students' major fields will be appropriately enhanced. This minor is open to English majors.

The humanities major and the graduate program in English are listed separately.

The Rho Xi Chapter of Sigma Tau Delta, the national English honor society, was chartered on June 16, 1978 and is also chartered by the ASI on this campus. Sigma Tau Delta is open to upperclass English majors if they have completed two or more English courses beyond freshman composition with a 3.0 average and if they rank in the upper one-third of their class overall. Graduate students in English are admitted if they have completed 12 or more units of graduate English with a 3.5 or better GPA. For additional information, contact Dr. Theodore C. Humphrey in the Department of English and Foreign Languages.

CORE COURSES FOR MAJOR

(Required of all students)

Writing about Literature	ENG	108	(4)
Survey of British Literature	ENG	207	(4)
Survey of British Literature	ENG	208	(4)
Survey of American Literature	ENG	211	(4)
Survey of American Literature	ENG	212	(4)
Western Literary Heritage	ENG	217	(4)
Adv Expository Writing	ENG	303	(4)
Novel in English to 1880	ENG	305	(4)
English Drama to 1890	ENG	307	(4)
Language and Human Behavior	ENG	313	(4)
Structure of Language	ENG	320	(4)
Grammar of Modern English	ENG	321	(4)
Chaucer	ENG	401	(4)
Milton	ENG	402	(4)
Shakespeare	ENG	403	(4)
Shakespeare	ENG	404	(4)
Literary Criticism	ENG	405	(4)
Upper-division lit course			(4)

SUPPORT & ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
The Visual Arts	ART	110	(4)
Freshman Composition	†ENG	104	(4)
Freshman Composition	ENG	105	(4)
French ***	FR	201	(4)
or	FR	202	
or	FR	203	
German ***	GER	201	
or	GER	202	
or	GER	203	
or Spanish ***	SPN	201	
or	SPN	202	
or	SPN	203	
History of Civilization	HST	101	(4)
or Hist of Civ	HST	102	

History of England to 1689	HST	330	(4)
or History of England since 1689	HST	331	
Survey of Music	MU	104	(4)
General Psychology	PSY	201	(4)
Advocacy and Argument	SP	204	(4)
Courses to complete General Education requirements (must include 16 units from GE Category II, Pattern 2, 4 units from Category IV, sec. A, 4 units from Category IV, sec. B, and 8 units from Category VII).			(32)
Free Electives			‡(38)

† All foreign students and students with permanent resident status must take ENG 102 and 103 in lieu of ENG 104 and 105.

*** 103-level language proficiency required.

‡ The total curriculum must include 60 units of upper division courses.

ENGLISH MINOR

The student must select 8 units from the following:

Survey of British Literature	ENG	207	(4)*
Survey of British Literature	ENG	208	(4)*
Survey of American Literature	ENG	211	(4)*
Survey of American Literature	ENG	212	(4)*

* Prerequisite: ENG 104

The student must select 24 units from the following (at least 12 units upper division): **

Freshman Composition	ENG	105	(4)
Writing about Literature (Prerequisite: ENG 105)	ENG	108	(4)
Grammar, Punctuation and Usage	ENG	125	(2)
Introduction to Modern Fiction	ENG	201	(4)
Introduction to Poetry or Modern Drama	ENG	202	(4)
Introduction to Shakespeare	ENG	203	(4)
Modern Fiction for Foreign Students	ENG	204	(4)
Black Literature in America	ENG	205	(4)
Contemporary Literature	ENG	206	(4)
Survey of British Literature	ENG	207	(4)
Survey of British Literature	ENG	208	(4)
Survey of American Literature	ENG	211	(4)
Survey of American Literature	ENG	212	(4)
The Ethnic Literatures of America	ENG	215	(4)
The Bible as Literature	ENG	216	(4)
Western Literary Heritage	ENG	217	(4)
Western Literary Heritage	ENG	218	(4)
The Literature of Science Fiction	ENG	222	(4)
Introduction to Folklore	ENG	231	(4)
Women Writers	ENG	240	(4)
Writing for the Professions	ENG	301	(4)
Creative Writing—Fiction	ENG	302	(4)
Advanced Expository Writing (Prerequisite: ENG 105)	ENG	303	(4)
The Development of the Short Story	ENG	304	(3)
The Novel in English to 1880	ENG	305	(4)
The Modern Novel	ENG	306	(4)
The English Drama to 1890	ENG	307	(4)
The Modern Drama	ENG	308	(4)
The English Poem	ENG	309	(4)
Language and Human Behavior	ENG	313	(4)
Structure of Language (Prerequisite: junior standing)	ENG	320	(4)
Grammar of Modern English (Prerequisite: junior standing)	ENG	321	(4)
Development of Modern English	ENG	322	(4)
Children's Literature	ENG	324	(4)
Adolescent Literature	ENG	326	(4)
Chaucer	ENG	401	(4)
Milton and His Contemporaries	ENG	402	(4)
Shakespeare	ENG	403	(4)
Shakespeare	ENG	404	(4)
Literary Criticism	ENG	405	(4)
English Renaissance	ENG	440	(4)
English Enlightenment	ENG	442	(4)
English Romanticism	ENG	444	(4)
Nineteenth-Century Novel	ENG	446	(4)
Victorian Writers	ENG	448	(4)
Twentieth-Century British Literature	ENG	450	(4)
American Renaissance	ENG	452	(4)
American Realism	ENG	454	(4)
Twentieth-Century American Literature	ENG	456	(4)
Senior Paper (Prerequisite: senior standing)	ENG	461	(2)
Senior Paper (Prerequisite: senior standing)	ENG	462	(2)
Senior Seminar (Prerequisite: senior standing)	ENG	463	(2)

SPANISH MINOR

May be taken by English majors

The student must complete the following three elementary courses or may fulfill all or part of this requirement by examination:

Elementary Spanish I	SPN	101	(4)
Elementary Spanish I	SPN	102	(4)
Elementary Spanish III	SPN	103	(4)

Lower division work is completed with three intermediate courses:

Intermediate Spanish	SPN	201	(4)
Intermediate Spanish Reading	SPN	202	(4)
Intermediate Spanish Conversation	SPN	203	(4)
Intermediate Spanish Composition	SPN	204	(4)

Three upper division courses are required, at least one of which must be from the first group:

1. Literature of Mexico	SPN	304	(4)
Spanish-American Literature	SPN	310	(4)
Spanish Golden Age Literature	SPN	315	(4)
2. Spanish Civilization	SPN	307	(4)
Latin American Civilization	SPN	308	(4)
Contemporary Latin American Civilization	SPN	309	(4)
Total units required in minor			(36)

Course Descriptions

ENG 095 Basic Communication Skills (5)

Communication skills program for students needing intensive and individualized writing and reading instruction. Analysis of student's reading and writing; lectures; individual tutorial programs. Passing grade in both reading and writing components required. 4 hours discussion, 3 hours laboratory. Students must take English Placement Test (EPT) or equivalent in order to enroll.

ENG 096 Basic Communication Skills (4)

Communication skills instruction at a more advanced level than ENG 100. Students required to take ENG 101 must pass course before enrolling in ENG 104. Passing grade in both reading and writing components required. 4 hours discussion, 3 hours individual study. Students must take English Placement Test (EPT) or equivalent in order to enroll.

ENG 102 College Composition for Foreign Students (4)

English composition for foreign students. Frequent exercises in reading and composition. Drill in selected problems in structure. 4 lecture-discussions. May be substituted for ENG 104. Prerequisite: satisfactory score on placement examination. Students must take English Placement Test (EPT) or equivalent in order to enroll.

ENG 103 College Composition for Foreign Students (4)

English composition for foreign students. Introduction to forms of exposition and logic. Technique of the term paper. Readings and compositions. Drill in selected problems in structure. 4 lecture-discussions. Prerequisite: ENG 102. Students must take English Placement Test (EPT) or equivalent in order to enroll.

ENG 104 Freshman Composition (4)

The fundamentals of written expression. Frequent papers, based chiefly on the student's personal experiences. Readings, 4 lecture-discussions. ENG 102 may be substituted for this course. Students must take English Placement Test (EPT) or equivalent in order to enroll.

ENG 105 Freshman Composition (4)

Frequent papers, chiefly informative and persuasive, with an emphasis on language and logic. Techniques of the research paper. Readings. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

ENG 108 Writing about Literature (4)

Readings in various genres; preparation of papers on a variety of literary topics. Frequent short papers. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

ENG 125 Grammar, Punctuation, and Usage (2)

A systematic and detailed study of grammar, punctuation, and usage. Frequent exercises; not a composition course. 2 lecture-discussions.

ENG 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ENG 201 Introduction to Modern Fiction (4)

Readings chiefly in the 20th-century short story and novel, with emphasis on man's search for knowledge, self-understanding, and values. For majors other than English. 4 lectures. Prerequisite: Eng 104 or equivalent.

ENG 202 Introduction to Poetry or Modern Drama (4)

Readings in either poetry or 20th-century drama, specific offerings to be determined by instructor. Emphasis on man's search for knowledge, self-understanding, and values. For majors other than English. 4 lectures. Prerequisite: ENG 104 or equivalent. May be repeated once for credit.

ENG 203 Introduction to Shakespeare (4)

Selected plays from the works of Shakespeare. For majors other than English. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 204 Modern Fiction for Foreign Students (4)

Readings chiefly in the 20th-century short story and novel, with emphasis on man's search for knowledge, self-understanding, and values. For majors other than English. Equivalent to ENG 201. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 205 Black Literature in America (4)

Analysis and evaluation of the works of major Black writers in America—from Phillis Wheatley to the present—in the light of cultural, political and social history. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 206 Contemporary Literature (4)

Readings, primarily novels, of important contemporary writers. Emphasis on controversial moral, social, and cultural issues. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 207, 208 Survey of British Literature (4) (4)

British literature, as exemplifying the history of ideas, from its beginning to the present, with emphasis on the major works. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 211, 212 Survey of American Literature (4) (4)

Philosophical, religious, political, and literary ideas in American writing from Colonial times to the present. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 215 Ethnic Literatures of America (4)

Works by and about such minorities as the American Indian and the Mexican-American, emphasis to be determined by the instructor. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

ENG 216 The Bible as Literature (4)

Old and New Testament narrative, poetry, and wisdom literature in the King James Version. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 217 Western Literary Heritage (4)

Readings in literature of the ancient world from the beginning to the 6th century after Christ, with emphasis on the history of ideas. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 218 Western Literary Heritage (4)

Readings in medieval and Renaissance literature from the 6th through the 16th centuries, with emphasis on the history of ideas. 4 lectures. Prerequisite: ENG 104 or equivalent.

ENG 222 The Literature of Science Fiction (4)

Science fiction as a literary genre. The history of science fiction. Seminal works (novels and short stories); major writers. The significance of science fiction in contemporary life and thought. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

ENG 231 Introduction to Folklore (4)

Introduction to folklore. Narrative, song, folklife, ballads, customs, beliefs, games, folk speech, and other genres. Collecting. Significance of folkloric phenomena in life and literature. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

ENG 240 Women Writers (4)

Selected readings in the works of major women writers. Emphasis on the contribution to literature by women authors. Prerequisite: ENG 104 or permission of instructor.

ENG 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ENG 301 Writing for the Professions (4)

Written work of the kind the student may be asked to do in his or her profession, including reports, investigative papers, and articles similar to those appearing in professional journals. 4 lecture-discussions. Prerequisite: ENG 104 or equivalent.

ENG 302 Creative Writing—Fiction (4)

The fundamentals of short story writing. Exercises in plotting, characterization, dialog, description, narration, and point of view. Readings; analysis of stories and exercises. 4 lecture-discussions. Prerequisites: a 200-level literature course and permission of instructor.

ENG 303 Advanced Expository Writing (4)

Current practices in such forms as the essay, commentary, magazine article. 4 lecture-discussions. Prerequisite: ENG 105 or equivalent.

ENG 304 The Development of the Short Story (3)

Critical analysis; history and evaluation of form. 3 lectures. Prerequisite: a 200-level literature course.

ENG 305 The Novel in English to 1880 (4)

Development of the novel in England and America to the rise of Naturalism; Defoe to Hardy. 4 lectures. Prerequisite: a 200-level literature course.

ENG 306 The Modern Novel (4)

Realism and its variants in the 19th and 20th centuries, from French and Russian beginnings. 4 lectures. Prerequisite: a 200-level literature course.

ENG 307 The English Drama to 1890 (4)

From Tropes to Shaw. 4 lectures. Prerequisite: a 200-level literature course.

ENG 308 The Modern Drama (4)

Continental, British, and American dramatic trends from the rise of Naturalism. 4 lectures. Prerequisite: a 200-level literature course.

ENG 309 The English Poem (4)

Critical analysis and evaluation of genres and single works, other than dramatic. 4 lectures. Prerequisite: a 200-level literature course.

ENG 313 Language and Human Behavior (4)

Semantics; the symbolic process of English. Relationship of words and phrasings to their referents. Effects of this relationship upon human thought, interpretation, and behavior. 4 lectures. Prerequisite: a 200-level literature course.

ENG 320 Structure of Language (4)

A study of phonology and morphology, with special emphasis on English. Includes work in phonetic transcription; phonological and morphological analysis. 4 lecture-discussions. Prerequisite: junior standing.

ENG 321 Grammar of Modern English (4)

Modern English syntax; emphasis on standard English. Other social and regional dialects; work with various grammars and dictionaries. 4 lecture-discussions. Prerequisite: junior standing.

ENG 322 Development of Modern English (4)

Principles of change in language as an aid to understanding present-day pronunciation, spelling, work formation, grammar, and usage. Emphasis on work derivation and semantic change. 4 lectures.

ENG 324 Children's Literature (4)

Readings in myth and folklore and in children's classics from the 18th century to the present. 4 lectures. Prerequisite: a 200-level literature course.

ENG 326 Adolescent Literature (4)

Selected readings in literature for the adolescent. Discussion of the nature and reading stages of the adolescent, criteria and sources for selecting adolescent literature, and effective methods of classroom presentation. 4 lectures. Prerequisite: a 200-level literature course.

ENG 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ENG 401 Chaucer (4)

Chaucer's principal works, with special emphasis on *The Canterbury Tales* and *Triolus and Criseyde.* Cultural background. 4 lectures. Prerequisite: a 200-level literature course.

ENG 402 Milton and His Contemporaries (4)

Paradise Lost, Samson Agonistes. Prose and minor poems. Selected works by such contemporaries of Milton as Andrew Marvell. Historical background. 4 lectures. Prerequisite: a 200-level literature course.

ENG 403 Shakespeare (4)

Selected plays through *Hamlet.* 4 lectures. Prerequisite: a 200-level literature course.

ENG 404 Shakespeare (4)

Selected plays after *Hamlet.* 4 lectures. Prerequisite: a 200-level literature course.

ENG 405 Literary Criticism (4)

Analysis of the works of selected major critics, with emphasis on the moderns. Application of principles in original critical essays. 4 lectures. Prerequisite: a 200-level literature course.

ENG 440 English Renaissance (4)

Poets, 1500–1600, such as Spenser, Sidney, Jonson, Donne. 4 lecture-discussions. Prerequisite: a 200-level literature course.

ENG 442 English Enlightenment (4)

Writers, 1660–1800, such as Dryden, Pope, Swift, Johnson. 4 lecture-discussions. Prerequisite: a 200-level literature course.

ENG 444 English Romanticism (4)

Writers such as Blake, Wordsworth, Coleridge, Byron, Shelley, Keats. 4 lecture-discussions. Prerequisite: a 200-level literature course.

ENG 446 Nineteenth-Century Novel (4)

Fiction of England and the Continent; writers such as Dickens, Flaubert, Dostoevsky. 4 lecture-discussions. Prerequisite: a 200-level literature course.

ENG 448 Victorian Writers (4)

Poetry and non-fiction prose of such authors as Carlyle, Arnold, Ruskin, Tennyson, Browning. 4 lecture-discussions. Prerequisite: a 200-level literature course.

ENG 450 Twentieth-Century British Literature (4)

Writers such as Conrad, Joyce, Yeats, Eliot, Lawrence. 4 lecture-discussions. Prerequisite: a 200-level literature course.

ENG 452 American Renaissance (4)

Writers such as Hawthorne, Emerson, Thoreau, Melville, Whitman, Dickinson. 4 lecture-discussions. Prerequisite: a 200-level literature course.

ENG 454 American Realism (4)

Writers such as Twain, Crane, Norris, London, James. 4 lecture-discussions. Prerequisite: a 200-level literature course.

ENG 456 Twentieth-Century American Literature (4)

Writers such as Faulkner, Fitzgerald, Hemingway, O'Neill, Frost. 4 lecture-discussions. Prerequisite: a 200-level literature course.

ENG 461, 462 Senior Paper (2) (2)

First quarter: research on a subject in literature or language, under the direction of a faculty tutor. Second quarter: completion of a paper. Especially recommended for prospective graduate students. Prerequisite: senior standing.

ENG 463 Senior Seminar (2)

Study and discussion of specially selected topics. 2 lectures. Prerequisite: senior standing.

ENG 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

Graduate courses are listed in the graduate section of this catalog.

French

FR 101 Elementary French I (4)

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation and grammar. 4 lecture-discussions.

FR 102 Elementary French II (4)

Extension of fundamentals of pronunciation and grammar for the continuing student. 4 lecture-discussions. Prerequisite: FR 101 or equivalent.

FR 103 Elementary French III (4)

Advanced grammatical patterns and pronunciation for the continuing student. 4 lecture-discussions. Prerequisite: FR 102 or equivalent.

FR 201 Intermediate French (4)

Review of grammar. Additional elements of French structure. Readings. 4 lecture-discussions. Prerequisite: FR 103 or equivalent.

FR 202 Intermediate French Reading (4)

Reading of varied short texts; establishing a steadily increasing vocabulary. Introduction to literary texts. Recommended for prospective graduate students. 4 lecture-discussions. Prerequisite: FR 103 or equivalent.

FR 203 Intermediate French Composition and Conversation (4)

French composition, both oral and written. Frequent original presentations. 4 lecture-discussions. Prerequisite: FR 103 or equivalent.

FR 220 Hotel and Travel Management French (2)

Study of the terminology relating to French wines, French menus (general and regional cuisine), organization of French restaurants and hotels, French culture and geography; basic French expressions used frequently by hotel and travel management staff. 2 lecture-discussions. Also listed as HRM 220.

FR 307 French Civilization (4)

Survey of French culture and social customs to the 20th century. Conducted in French. 4 lecture-discussions. Prerequisite: FR 103 or equivalent.

FR 308 Contemporary France (4)

Culture of 20th century France, including art, music, history, literature, social customs, and the systems of government and education. Conducted in French. 4 lecture-discussions. Prerequisite: FR 202 or equivalent.

German

GER 101 Elementary German I (4)

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation, and grammar. 4 lecture-discussions.

GER 102 Elementary German II (4)

Extension of fundamentals of pronunciation and grammar for the continuing student. 4 lecture-discussions. Prerequisite: GER 101 or equivalent.

GER 103 Elementary German III (4)

Advanced grammatical patterns and pronunciation for the continuing student. 4 lecture-discussions. Prerequisite: GER 102 or equivalent.

GER 104 Conversational German for Beginners (4)

Essentials of the spoken language for the beginner. Emphasis on everyday vocabulary and useful phrases for the traveler. Course includes fundamentals of reading and writing German but not of grammar. 4 lecture-discussions.

GER 201 Intermediate German (4)

Review of grammar; conversation; readings in original German. 4 lecture-discussions. Prerequisite: GER 103 or equivalent.

GER 202 Intermediate German Reading (4)

Development of reading proficiency in German; analysis and discussion of texts; some translation. Recommended for prospective graduate students. 4 lecture-discussions. Prerequisite: GER 103 or equivalent.

GER 203 Intermediate German Composition and Conversation (4)

Fundamentals of German composition; intensive practice in conversation; idiomatic German; vocabulary building. Frequent oral and written original presentations. 4 lecture-discussions. Prerequisite: GER 103 or equivalent.

GER 307 German Civilization (4)

Survey of German culture and social customs. Conducted in German. 4 lectures. Prerequisite: GER 202 or equivalent.

Spanish

SPN 101 Elementary Spanish I (4)

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation, and grammar. 4 lecture-discussions.

SPN 102 Elementary Spanish II (4)

Extension of fundamentals of pronunciation and grammar for the continuing student. 4 lecture-discussions. Prerequisite: SPN 101 or equivalent.

SPN 103 Elementary Spanish III (4)

Advanced grammatical patterns and pronunciations for the continuing student. 4 lecture-discussions. Prerequisite: SPN 102 or equivalent.

SPN 201 Intermediate Spanish (4)

Review of grammar. Additional elements of Spanish structure. Readings. 4 lecture-discussions. Prerequisite: SPN 103 or equivalent.

SPN 202 Intermediate Spanish Reading (4)

Development of reading proficiency in Spanish; analysis and discussion of texts; some translation. Recommended for prospective graduate students. 4 lecture-discussions. Prerequisite: SPN 103 or equivalent.

SPN 203 Intermediate Spanish Conversation (4)

Intensive practice in conversational Spanish; vocabulary building; idiomatic expressions. Frequent oral presentations. 4 lecture-discussions. Prerequisite: SPN 103 or equivalent.

SPN 204 Intermediate Spanish Composition (4)

Fundamentals of written expression. Frequent essays, chiefly informative and persuasive. 4 lecture-discussions. Prerequisite: a 200-level Spanish course or permission of instructor.

SPN 215 Hispanic and American Indian Folklore of the Southwest (3-4)

Survey of Southwest folklore; emphasis on tales, legends, *corridos,* and the evolution of modern folkloric genres. Variable credit depending on whether the student chooses to do field work. 3 lectures, optional fieldwork. Prerequisite: SPN 203 or equivalent.

SPN 304 Literature of Mexico (4)

Mexican literature as exemplifying the history of ideas, from its roots in pre-Columbian and colonial prose and poetry to the present; emphasis on major works. 4 lectures. Prerequisite: SPN 203 or permission of instructor.

SPN 307 Spanish Civilization (4)

Culture of Spain, including art, music, history, social customs, and world outlook. Conducted in Spanish. 4 lectures. Prerequisite: SPN 202 or equivalent.

SPN 308 Latin American Civilization (4)

Culture of Latin America; pre-Columbian civilizations, colonial and early national periods. Conducted in Spanish. 4 lectures. Prerequisite: SPN 202 or equivalent.

SPN 309 Contemporary Latin American Civilization (4)

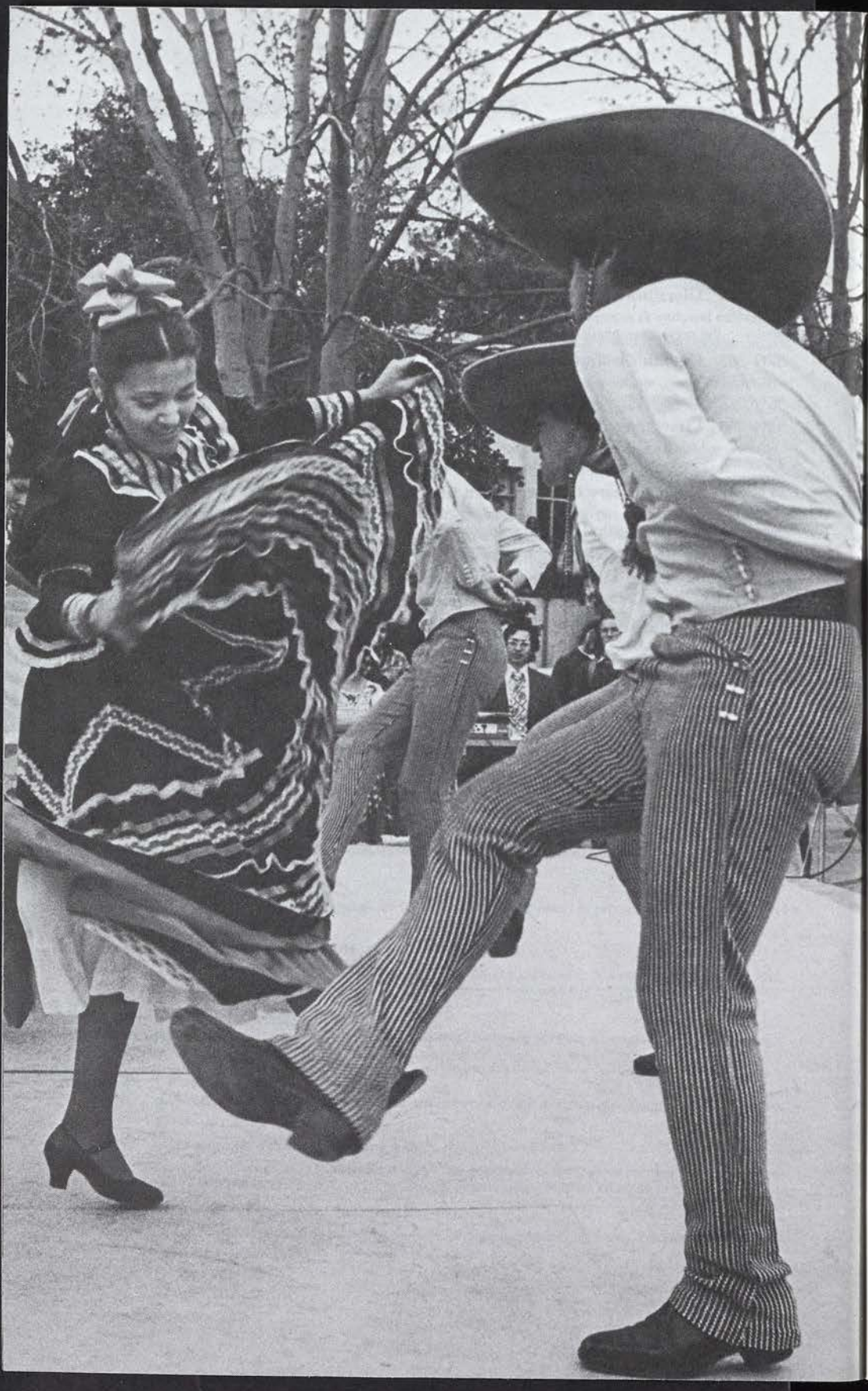
Culture of present-day Latin America, including art, music, history, and social customs. Relations with the United States. Conducted in Spanish. 4 lectures. Prerequisite: SPN 202 or equivalent.

SPN 310 Spanish-American Literature (4)

Selected aspects of Spanish-American literature. 4 lectures. Prerequisite: SPN 202 or equivalent or permission of instructor.

SPN 315 Spanish Golden Age Literature (4)

Golden Age (1550-1700) Spanish writers such as Cervantes, Gongora, Lope de Vega, Quevedo, and Calderon de la Barca. 4 lecture-discussions. Prerequisite: SPN 202 or permission of instructor.



ETHNIC AND WOMEN'S STUDIES DEPARTMENT

Richard Santillan, *Acting Chair*

John Hatfield Mario Suarez James H. Williams

Charles C. Irby

The Ethnic and Women's Studies Department offers a program of courses on the history, culture and current issues of ethnic groups and of the study of sex roles in the United States. The program is designed as an educational forum in which students and faculty explore together the subjects of ethnicity and sex roles. The program consists of minors in Afro-American Studies, American Indian Studies, Asian-Pacific Studies, Chicano-Hispanic Studies, and Women's Studies.

The purpose of Ethnic and Women's Studies is to provide students with the skills, intellectual habits, critical attitudes, and broad perspectives necessary to function in, and contribute to, a changing world. In addition, students need the ability to make sound moral judgments and to gain a sensitivity to the aesthetic and humanistic dimensions of this changing world.

Courses are open to all students in the university. Enrollment is encouraged for those who are seriously concerned about the quality of life in 20th century America, and wish to do something about it. Fields in which such concerns can find direct application are teaching, urban planning, social services, politics, recreation, law, the ministry, and others that have a direct bearing on particular ethnic groups.

AFRO-AMERICAN STUDIES MINOR

Introduction to Ethnic Studies	EWS	140	(4)
Afro-American Experience	EWS	201	(4)
The Ethnic Woman	EWS	390	(4)
Afro-American Contemporary Issues	EWS	402	(4)
Racism and Sexism	EWS	420	(4)
16 elective units must be chosen in consultation with advisor			(16)
Total units required for the minor			(36)

AMERICAN INDIAN STUDIES MINOR

Introduction To Ethnic Studies	EWS	140	(4)
American Indian Experience	EWS	202	(4)
The Ethnic Woman	EWS	390	(4)
American Indian Contemporary Issues	EWS	403	(4)
Racism and Sexism	EWS	420	(4)
16 elective units must be chosen in consulation with advisor			(16)
Total units required for the minor			(36)

ASIAN-PACIFIC STUDIES MINOR

Introduction to Ethnic Studies	EWS	140	(4)
Southeast Asian-Pacific Experience	EWS	204	(4)
The Ethnic Woman	EWS	390	(4)
Asian-Pacific Contemporary Issues	EWS	404	(4)
Racism and Sexism	EWS	420	(4)
16 elective units must be chosen in consultation with advisor			(16)
Total units required for the minor			(36)

CHICANO/HISPANIC STUDIES MINOR

Introduction to Ethnic Studies	EWS	140	(4)
Chicano/Hispanic Experience	EWS	203	(4)
The Ethnic Woman	EWS	390	(4)
Chicano Contemporary Issues	EWS	401	(4)
Racism and Sexism	EWS	420	(4)
16 elective units must be chosen in consultation with advisor			(16)
Total units required for the minor			(36)

WOMEN'S STUDIES MINOR

Introduction to the Study of Women	EWS	145	(4)
Women in Contemporary Society	EWS	380	(4)
The Ethnic Woman	EWS	390	(4)
Racism and Sexism	EWS	420	(4)
Women's Philosophical and Social Issues	EWS	440	(4)
16 elective units must be chosen in consultation with advisor			(16)
Total units required for the minor			(36)

Course Descriptions

EWS 101 University Methods and Values (4)

Understanding of methods and values of the University as they relate to students; historical and contemporary assessment of mission of University; culture of the academic environment; values associated with developing critical thinking and communication skills. 4 lecture-discussions.

EWS 140 Introduction to Ethnic Studies (4)

A basic survey of the American ethnic experience including an analysis of the changing social and cultural characteristics of the four major racial-ethnic groups in the United States: American Indians, Afro-Americans, Hispanics, Asian/Pacific Americans. Goals and purposes of Ethnic Studies within context of American ethnic dimension. 4 lecture-discussions.

EWS 145 Introduction to the Study of Women (4)

Survey of the perceived cultural, historical role of women in the U.S.; changing sex roles of women and men; feminism and human liberation. 4 lecture-discussions.

EWS 201 Afro-American Experience (4)

Survey of the Afro-American heritage in the United States; emphasis on historical, political, educational, economic, and social roles of Blacks in American society. 4 lecture-discussions.

EWS 202 Chicano/Hispanic Experience (4)

Survey of various aspects of Chicano/Hispanic experiences and the formation of ideological perspectives; effects of the family, peer groups, social class, education and racism on identity development. 4 lecture-discussions.

EWS 203 American Indian Experience (4)

Survey of American Indian heritage in the United States; emphasis on historical, political, educational, economic and social roles. 4 lecture-discussions.

EWS 204 Asian Pacific Experience (4)

Introduction to the experience of being an Asian Pacific islander in America. Special focus on the historical/sociological/cultural analysis of the origins of the Southeast Asian-Pacific peoples of the U.S. Comparative perspective emphasized. 4 lecture-discussions.

EWS 280 Community Fieldwork and Tutorials (3)

One-to-one tutorial work and interpersonal growth with elementary and secondary students; in conjunction with the Mexican-American Student Association. Academic studies through innovative, experimental activities and social relationships in community agencies. May be repeated for total of 6 units.

EWS 301 Ethnic Identity (4)

Biological, psycho-social and cultural aspects of ethnic identity formation. Influences of family patterns, roles of educational system, peer group involvement, socio-economic status, racism, sexism, and discrimination. 4 lecture-discussions. May be repeated for credit when different ethnic group offered.

EWS 320 Ethnicity, Folklore and the Fine Arts (4)

Folklore, art and music of ethnic groups; their meaning and value. Images of ethnic identity; artistic expression, stereotypes, contemporary uses. 4 lecture-discussions. May be repeated for credit when different ethnic group offered.

EWS 330 Ethnicity and Family Life (4)

Examination of the unique social and cultural aspects of marriage and family styles from the perspective of American ethnic groups. 4 lecture-discussions. Prerequisite: EWS 140, SOC 321 or permission of the instructor. May be repeated for credit when different ethnic group offered.

EWS 345 Ethnic Groups and the Labor Movement (4)

Analysis of the changing role of minorities as workers in the labor force and general economic progress of American ethnic groups. Historical development of ethnic labor unions at all levels focusing on strikes, boycotts, right-to-work laws, benefits and labor legislation. 4 lecture-discussions. May be repeated for credit when different ethnic group offered.

EWS 350 Ethnic Immigration (4)

Historical analysis of socio-economic and political factors which have determined and continue to form the basis for development of U.S. immigration policies and practices toward ethnic minorities. 4 lecture-discussions. May be repeated for credit when different ethnic group offered.

EWS 360 Ethnic Cultures in the U.S. (4)

Comparative and humanistic study of ethnic groups; historical experiences; contact between and among groups and dominant culture. Emphasis placed on one or more ethnic groups per quarter. 4 lecture-discussions. May be repeated for credit when different ethnic group offered.

EWS 380 Women in Contemporary Society (4)

Current topics concerning women in political, economic, artistic and public realms. Explains status and ambitions of women within those fields, problems confronting them, and insights and options available. 4 lecture-discussions. Repeatable as topic and focus vary.

EWS 390 The Ethnic Woman (4)

Issues concerning ethnic women through study of causes and effects of sexism and ethnocentrism depending on available faculty specialization. 4 lecture-discussions. Prerequisite: EWS 140 or 145 or permission of instructor. Repeatable for credit whenever different ethnic group offered.

EWS 401 Chicano Contemporary Issues (4)

Impact of Chicano movement on cultural continuity and socio-political issues at local, national and international levels. Eroding effects of educational, economic and political institutions. Legislation affecting Chicanos in immigration, employment, health, welfare, sex discrimination, education and voting rights. 4 lecture-discussions. Prerequisite: EWS 140 or permission of instructor.

EWS 402 Afro-American Contemporary Issues (4)

Impact of Black movement on cultural continuity and socio-political issues at local/national levels. Eroding effects of educational, economic and political institutions. Prerequisite: EWS 140 or permission of instructor. 4 lecture-discussions.

EWS 403 American Indian Contemporary Issues (4)

Socio-cultural factors of American Indian life; politics, education, economics, health; Bureau of Indian Affairs, and special legal status of Indians; problems of relocation, water, land rights. Self determination and implications. 4 lecture-discussions.

EWS 404 Asian-American Contemporary Issues (4)

Survey of contemporary issues faced by Asian-Pacific peoples in the U.S. Emphasis placed on immigration, health, education, employment, family structure, and cultural issues. 4 lecture-discussions.

EWS 420 Racism and Sexism (4)

Exploration of racist and sexist issues in contempoary society. Identification of problem areas and methods for solutions. 4 lecture-discussions. Prerequisite: EWS 140, 145 or permission of instructor.

EWS 430 Ethnic Thought and Value (4)

Philosophical and religious traditions as expressions of ethnic values; contemporary expressions, leaders/movements; conflict of ideologies; relation of thought to political and social action. Repeatable only when ethnic groups differ. 4 lecture-discussions.

EWS 440 Women's Philosophical and Social Issues (4)

Fundamental questions of women's experiences, roles in society, nature of women's identity, roots of sexism, social factors that shape women's lives. Prescriptive models for alternative/liberating roles. 4 lecture-discussions.

EWS 450 Women, Ethnicity and Education (4)

History of American education as it has affected women, Afro-Americans, Mexican-Americans, Asian-Americans, American Indians, and recent immigrants. 4 lecture-discussions.

EWS 470 Community Development (2-4)

Key concepts and variables in analysis of the dynamics of community power structures and ethnic community development. Prerequisite: EWS 140 or permission of instructor. 2-4 hours.

EWS 495 Selected Topics in Ethnic and Women's Studies (2-4)

Concentrated study of Ethnic and Women's Studies materials; varying topics. Research required. Seminar. 2-4 hours. Prerequisite: EWS 140, 145 or permission of instructor. May be repeated for total of 4-8 units.

EWS 496 The Ethnic Perspective in American Society (4)

Evaluation of ethnic perspective related to American society stressing historical-cultural-social antecedents of contemporary issues, current problems and issues of ethnic groups and American institutions, including education, government, church and social agencies. 4 lecture-discussions.

HISTORY

David R. Smith, *Chair*

Anthony L. Brundage
Donald S. Castro
Stephen F. Englehart
William M. Evans
Frederick B. Heath
James G. Kamusikiri
David L. Levering
Gloria R. Lothrop
Donald H. Pflueger
Ralph E. Shaffer
William A. Smith
George H. C. Wong

The history curriculum provides broad, basic offerings for general education as well as the opportunity for major specialization leading to the bachelor of arts degree. The History Department also offers two programs leading to minors in history. Courses are designed to encourage students to seek out relevant relationships to contemporary social, political, and cultural issues, and to provide historical perspective on materials studied in other departments of the university.

The major provides a foundation for students seeking a standard secondary teaching credential and qualifies graduates for a variety of civil service and other occupational opportunities. It also serves as pre-professional training for law and graduate-work leading to college teaching.

History majors may select from two curriculum tracks. The first, printed below, reflects the judgment of the department as to what represents a well-balanced history major. The second provides the opportunity for students, in conjunction with an advisor, to structure their curriculum in accord with their intellectual interests and vocational objectives. Students majoring in history have the opportunity to join Phi Alpha Theta, the International Honor Society in History. For additional information contact the Department Chair.

CORE COURSES FOR MAJOR

(Required of all students)

History of Civilization	HST	101	(4)
History of Civilization	HST	102	(4)
History of Civilization	HST	103	(4)
United States History	HST	201	(4)
History Methods	HST	300	(4)
Senior Project	HST	461	(2)
Senior Project	HST	462	(2)
Undergraduate Seminar	HST	463	(2)
History (300–400 level)			(4)
† Area Studies			(12)
§ American History Series			(12)
‡ European History Services			(12)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

* Intro to Phys Anthro	ANT	101	
or Physical Geog	GEO	101	(4)
* Intro Cul Anth	ANT	102	
or Prin Soc	SOC	201	(4)
* Prin of Econ	EC	201	(4)
Prin of Econ	EC	202	(4)
*Gen Psychol	PSY	201	(4)
* Freshman Comp	ENG	104	(4)
* Freshman Comp	ENG	105	(4)
* Pub Speaking	SP	204	(4)
* Intro Amer Govt	PLS	201	(4)
* U.S. History	HST	202	(4)
Additional courses to meet General Education (must include one laboratory science course and 12 upper division units, 4 of which must come from Category II, III or IV and replace lower division units in area chosen). See advisor to plan.			(36)
Courses to be selected in conjunction with advisor from departmental approved list			(8)
Students desiring to pursue graduate study should take at least one foreign language. *Designates G.E. course			
Unrestricted electives			(36)
(COM 324 recommended unrestricted elective)			
Select with consent of advisor **			

† Select 12 units of history area studies with the approval of advisor from HST 301, 302, 303, 304, 305, 306, 311, 312, 313, 399, 421, 422, 423, 432, 434, 450.

§ Select 12 units of American history series with the approval of advisor from HST 336, 337, 340, 341, 342, 399, 401, 402, 403, 404, 405, 406, 407, 410, 412, 413, 414, 415, 416, 435.

‡ Select 12 units of European history series with the approval of advisor from HST 319, 320, 321, 322, 323, 324, 325, 330, 331, 332, 351, 399, 418, 419, 420.

** The total curriculum must include 60 units of upper division courses.

HISTORY MINOR

History of Civilization	* HST	101	(4)
History of Civilization	* HST	102	(4)
History of Civilization	* HST	103	(4)
Twenty units in history will be selected in consultation with a History Department faculty advisor. Consideration will be given to student interests and vocational objectives. Suggested groups of courses include American History, European History, Third World History, Minorities in American History and California History			** (20)

* It is recommended that HST 201 and 202 in combination with Political Science 201 be taken to fulfill the General Education requirements of American Civilization.

** The minor must include at least 9 upper division units.

LATIN AMERICAN STUDIES MINOR—

May be taken by History majors

Cultural Areas of World (Latin America)	ANT	399	(4)
Geography of Latin America	GEO	352	(4)
History of Latin America	HST	304	(4)
History of Latin America	HST	305	(4)
Comparative Politics of Latin America	PLS	342	(4)

The student must select 8 units from the following:

Peasant Societies	ANT	351	(4)

U.S.-Latin American Relations	PLS	454	(4)
History of Latin America	HST	306	(4)
History of Brazil	HST	432	(4)
History of Mexico	HST	434	(4)
Literature of Mexico	SPN	304	(4)
Spanish-American Literature	SPN	310	(4)

Students in the minor are encouraged to have language competency in Spanish or if possible Portuguese. For further information on Minor see Dr. Donald S. Castro, Latin American Studies Coordinator.

Course Descriptions

HST 101 History of Civilization: The Ancient World (4)

Origin and development of civilization in Eurasia including Mesopotamia, Egypt, India, China, Israel, Greece and Rome. Integrative study of ancient political, economic, and social organizations, technological achievements, and mythological, religious, and artistic expressions. 4 lecture-discussions.

HST 102 History of Civilization: The Middle Period (4)

Cross cultural study of Western Christendom, Byzantium, Islam, India, East Asia, Africa and Americas. Impact of Central Asian nomads on Eurasian civilizations. Medieval origins of European science and technology. European Renaissance, Reformation, and expansion into Africa, Asia, and Americas. 4 lecture discussions.

HST 103 History of Civilization: The Modern World (4)

Rise of sovereign and national states; development of capitalist and industrial economy and scientific and secular culture in Europe; revolution in traditional society, values, and culture. Western Imperialism and revolt of Third World. 4 lecture-discussions.

HST 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

HST 201 United States History (4)

A survey of the history of the United States from earliest exploration to the end of the Civil War (1865), with emphasis on the political, social and economic trends and episodes which molded and characterized the early American nation. 4 lecture-discussions.

HST 202 United States History (4)

A survey of the history of the United States together with state and local materials from the Reconstruction (1865) to the present. Emphasis on the political, social, cultural and economic trends and events which have molded and characterized America as a modern nation and world power. Meets the U.S. History part of U.S. History and Institutions requirement for graduation.

HST 210 The Black Man in America (4)

The diaspora of the Blacks to the New World and their subsequent cultural contributions. The slave trade. Slavery in North and South America and its effect upon Afro-American culture. 4 lecture-discussions.

HST 211 The Black Man in America (4)

Black history from the Civil War to World War I. Impact of the Reconstruction era upon the Black man's quest for self-identity and full participation in American life. 4 lecture-discussions.

HST 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

HST 300 History Methods (4)

Introduction to the methods of historical research; bibliography; textual analysis, source criticism, writing. 4 lecture-discussions.

HST 301 History of East Asia to 1800 (4)

Summary of historical developments, analysis of social, economic, and political institutions, and evaluation of intellectual and aesthetic traditions of China, Japan, and Korea from the ancient period to the 19th Century. 4 lecture-discussions.

HST 302 History of East Asia in 19th Century (4)

China, Japan, and Korea in the 19th Century, with particular emphasis on the role played by the United States in that part of the world. 4 lecture-discussions.

HST 303 History of East Asia in 20th Century (4)

China, Japan, and Korea in the 20th Century, with particular emphasis on the role played by the United States in that part of the world. 4 lecture-discussions.

HST 304 History of Latin America: The Colonial Period (4)

Latin America from its pre-Colombian origins to the era of the Wars of Independence. Emphasis on the social and cultural factors which characterized the colonial period.

HST 305 History of Latin America: The Era of Nation Building (4)

Latin America during the 19th century (1810–1910) with emphasis on the socio-political factors which were important in the creation of the Latin American nations. Special focus on the developments of the Río de la Plata, the Andean nations, and Mexico.

HST 306 History of Latin America: Problems of the 20th Century (4)

Current problems of Latin America such as land tenure and use; the power elite and their role in society; the Latin American university. Foreign interests in Latin America and their effect on economic and political development. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 311 History of South Asia (4)

The South Asian subcontinent from ancient India to the present. Traditional India; European expansion; British India; World War II; partition and evolution of modern India, Pakistan, Bangladesh, and Sri Lanka. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 312 History of Southeast Asia (4)

Southeast Asia from pre-European civilizations to the modern era. Indigenous cultures before the arrival of the Europeans; building of the Western imperialist matrix; the era before World War II; Japanese expansion; the postwar spread of nationalism and Communism. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 313 History of Southwest Asia and North Africa (4)

From the rise of the Ottoman Empire to the present. Cultural developments of the region; political, social, and economic problems of the 20th century. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 319 History of Greece (4)

Aspects of ancient Greece, including the Homeric question, rise of classical Greece; appearance of historiography, tragedy, and other literary forms; Athenian vs. Spartan imperialism; the Socratic problem and the failure of the city-state. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 320 Republican and Imperial Rome (4)

Comparative cultural aspects of the Roman Republic and Empire. The conflict of the orders; conquest of Italy and the Empire; Roman Revolution; evolution of the principate into the dominate. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 321 Medieval Europe (4)

Medieval Europe as a forerunner to modern Europe. The fall of Rome, triumph of Christianity, "Dark Ages," rise of cities and commerce. Feudalism, papal hierarchy, religious quarrels, crusades and witchcraft. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 322 Age of Renaissance, Reformation, and Wars of Religion (4)

Europe from the 15th to mid-17th Centuries. Italian city states, Humanism. Origins of European Empires, rise of competitive sovereign states, development of capitalism, breakdown of Christian unity. Cultural achievements of the Renaissance and Reformation, including origins of modern science. 4 lecture-discussions.

HST 323 Age of Enlightenment and Revolution (4)

Europe from the rise of Louis XIV through Napoleon. Origins and development of the Enlightenment. Struggle between France and England for wealth and world power. Causes and impact of the French Revolution and Napoleonic Era. 4 lecture-discussions.

HST 324 Europe in the 19th Century (4)

Europe from the Congress of Vienna to World War I. Impact of industrialization and revolutionary aspirations on social structure and cultural values of European civilization. State-building and imperialism. 4 lecture-discussions.

HST 325 Europe in the 20th Century (4)

The political, economic, and social forces which have influenced the great European powers in the 20th century. The development of 20th-century ideologies. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 330 History of England to 1689 (4)

English history to the Civil War. Celtic, Roman, Anglo-Saxon, and Norman foundations. Development of monarchy, parliament, and common law. Nationalism. Renaissance and Reformation, emphasizing Henry VIII and Elizabeth I. First colonial ventures. Causes of the Civil War. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 331 History of England since 1689 (4)

England since the Civil War. Development of limited monarchy and oligarchic dominance. Transformations in agriculture, technology, and industry. Constitutional and social reforms. Rise and fall of the Empire. Victorian culture. Socialism and the emergence of the welfare state. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 332 Great Britain in the Industrial Revolution (4)

Transformation of the economy, social structure, political and intellectual life, 1783–1914. Effects of industrialization and urbanization; development of democracy, parties, and centralized bureaucracy; social and educational reforms; emergence of socialism and imperialism. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 336 The Black Man in America (4)

From World War I to the present. The Pan-African movement and its influence upon American Black nationalist movements, civil rights, and other current Black movements. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 337 History of the American Indians (4)

Origins of native Americans; archaeological remains of major North American regions; European contacts and cultural cross-fertilization; development of federal Indian policy; recent and contemporary status; relation of Indian conceptions of the universe to the ecological crisis. 4 lecture-discussions.

HST 340 Diplomatic History of the United States (4)

Historical problems in U.S. foreign relations. Motivations for policy decisions; Revolutionary diplomacy; Washington's farewell address; the Monroe Doctrine; imperialism in the 19th century; 20th-century expansion into world affairs, the Cold War, detente. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 341 History of the American West (4)

The impact of the West on American democratic ideals and institutions. The role of the trapper, trader, Indian, cowboy, miner, and farmer. The frontier in literature, mythology, and the American conscience. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 342 History of California (4)

From Spanish beginnings to the present. Missions and ranchos; the gold rush; railroads; development of agriculture and industry. Politics, water development, education, technology, immigration, minorities, utopias, interaction with nation and world, new life-styles, and contemporary issues. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 343 Regional History of Southern California (4)

History of Southern California as a distinctive geographical, economic, cultural, social, and political entity. Interrelation of the region with the state, nation, and world. 4 lecture-discussions. Prerequisite: HST 342 or permission of instructor.

HST 344 Local History of Southern California (4)

Emphasis on history of Pomona and East San Gabriel Valleys. Origins of cities, inhabitants, and institutions; relationships to state and nation. Field trips. 4 lecture-discussions. Prerequisite: HST 342 or permission of instructor.

HST 345 Social History of Southern California (4)

Roots and growth of cultism and radicalism in the political, social, and cultural life of Southern California; individuals and movements which reflect these phenomena. 4 lecture-discussions. Prerequisite: HST 342 or permission of instructor.

HST 351 History of the Scientific Revolution (4)

Study of the revolution in Western man's perception and understanding of nature between the time of Copernicus and Newton. Emergence of science during a time of political, social, and religious upheaval. Relationship to art, the occult, philosophy, and technology. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 399 History of Modern Nation States (4)

Analysis of events and developments that shaped a modern nation state, selected in advance and based on faculty specialization. Topics include cultural achievements, nationalism, regionalism and separatism, ethnic and religious minorities, social class, ideology, modernization, and imperialism. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor. May be repeated whenever a different historical period of the nation or a new nation is offered.

HST 400 Special Problems for Upper Divison Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

HST 401 American Colonial History (4)

Political, social and economic study of the Anglo-Colonial world. Qualities of colonial life as contributory reasons for revolt. Colonial cultural debt to the Old World. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 402 America in the Federal Period (4)

The American Revolution and Constitutional Era, the evolution of the nation to the age of Jackson, with attention to political, economic and social problems. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 403 The Age of Jackson (4)

Rise of the common man, development of the political party system, increasing political influence of the West and Manifest Destiny from 1820 to 1850. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 404 Civil War and Reconstruction (4)

Internal development and expansion of the American people and the rise of sectional conflict, culminating in the Civil War and Reconstruction. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 405 The Gilded Age and the Progressive Era 1865–1914 (4)

Rise of American capitalism; "robber barons"; labor unrest; agrarian protest; immigration; urbanism; social Darwinism vs. the social gospel; socialism; imperialism; progressive reform. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 406 War and Depression: The United States 1914–1945 (4)

The United States from the origin of World War I to the conclusion of World War II; domestic problems of the twenties and thirties; international developments between the two wars. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 407 United States since 1945 (4)

America in the aftermath of war. Foreign policy from cold war to detente. Social upheaval from Montgomery to Kent State. Partisan politics from Joseph McCarthy to Carter. Culture, art, religion in an age of anxiety. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 410 Rise of the City in American Life (4)

Major facets of American life emerging in the city; urban thought from the 17th century to the present. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 412 Euro-Asian Immigrants in American Life (4)

European and Asian immigrants; their role in the contributions to the political, economic, social, and cultural life. Problems of assimilation and the myth of the "melting pot." 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 413 History of the South (4)

Unique forces which have shaped Southern culture; environmental factors which have affected Southern citizens, white and black. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 414 History of Collective Bargaining (4)

History and practice of the collective bargaining principle and of the American labor movement. Contemporary trends in the labor movement and in the use of collective bargaining for social problem-solving among diverse groups. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 415 Religion in American History (4)

Social and theological roots of American religions. Beliefs of native Americans; contributions of Protestants, Catholics, and Jews. The unique qualities of each tradition and common cultural influences upon each. Recent developments. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 416 History of Women in the United States (4)

Contributions of individual women and women's groups. Their roles in Colonial America, along the moving frontier, in urban reform and organized labor, and in the marketplace. Emphasis on questions of sexual stereotyping and historic legal rights of women. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 417 Land Use and Policies in American History (4)

Land utilization and policies from colonial beginnings to present. Land as an inducement to immigration, as a source of Indian conflicts, and as capital; impact on American institutions; relation to frontier democracy; exploitation to conservation; national forests and parks; national land use policy. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 418 History of Eastern Europe (4)

Eastern Europe exclusive of the Soviet Union with an emphasis on the unique and often crucial role played in European history by states or areas such as Poland, Hungary, Yugoslavia, and Rumania. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 419 Russia from the Ancient Period to 1917 (4)

The political, social, and cultural history of Russia from the pre-Christian era until the Bolshevik Revolution. Emphasis on the rise of Muscovy and the interplay between various ethnic groups. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 420 The Soviet Union since 1917 (4)

Bolshevik Revolution, Soviet constitution, development of political institutions, major economic and diplomatic development since 1917. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 421 Pre-Colonial Africa (4)

Indigenous cultural, political, and economic institutions of African societies. Rise and fall of various ancient African kingdoms; their characteristic cultures, contributions, and problems, from the earliest times to the advent of the colonial episode. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 422 Colonial Africa (4)

From earliest contact between Africans and Europeans to dawn of African nationalism. Atlantic slave trade; diaspora to New World; 1884-1885 Berlin Conference and partition of Africa; European colonial policies and African response. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 423 African Nationalism and Decolonization (4)

Period of trusteeship; emergence of contemporary African nationalist movements; decline of European colonization; African independence; social, political, and economic aspects of contemporary African nations. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 432 History of Brazil (4)

Survey of political, social, and economic growth. Focus on the demographic and social movements that created modern Brazil. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 434 History of Mexico (4)

Origins and development of modern Mexico; its Indian and Hispanic heritage, Mexican-United States relations, and Mexico's impact on the United States. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor. (HST 304 or 305 suggested).

HST 435 The American Southwest in the 20th Century (4)

The history of the Southwest from 1900, especially the Anglo impact on the multicultural inhabitants of the region. Economic influences on patterns of life and political behavior; the contemporary struggle for identity of Chicanos. 4 lecture-discussions. Prerequisite: upper division standing or permission of instructor.

HST 450 History of Chinese Communism (4)

The Chinese Communist movement from 1921 to the present. Emphasis on major political, economic, social, ideological, and international developments. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report required. Prerequisite: senior standing. Required minimum of 120 hours.

HST 463 Undergraduate Seminar (2)

Study and discussion by students of recent developments in the students' major fields. 2 lectures. Prerequisite: major standing.

HST 470 History and Historians (4)

Critical and analytical treatment of the various interpretations of history in an effort to determine their validity and relevance for the present. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

HST 510 History of American Business (4)

American business from colonial beginnings to present. Economic, social and political forces influencing the structure and status of business in American life. Consequences of the Industrial Revolution and the prevailing social ideologies upon the organization and ethical values of the business community. Effect of technology, wars, industrialization, and welfare state upon business and its role in society. Lecture-discussion, 4 hours. *Dr. Heath*

HUMANITIES

One of the two majors offered in the English and foreign languages department is humanities. For other programs in the department see English and foreign languages.

Harold P. Levitt, *Chair,* English and foreign languages.

The humanities major, which is housed in the Department of English and Foreign Languages, is designed for the student whose main goal as an undergraduate is the acquisition of a liberal education. Enough elective freedom is provided so that a student can also prepare for a career in law, medicine, business, or other fields. Students are expected to choose electives in concert with advisors, who will help them keep abreast of specific requirements for entry into a business training program, graduate school, or professional school.

CORE COURSES FOR MAJOR

(Required of all students)

Indians of North America	ANT	321	(4)
or Peoples & Cultures of Mesoamerica	ANT	322	
or Cultures of South America	ANT	323	
or Peoples and Cultures of Africa	ANT	324	
Survey of British Literature	ENG	208	(4)
Survey of American Literature	ENG	211	(4)
Western Literary Heritage	ENG	217	(4)
Western Literary Heritage	ENG	218	(4)
or Survey of British Literature	ENG	207	
Writing for the Profession	ENG	301	(4)
or Creative Writing	ENG	302	
or Advanced Expository Writing	ENG	303	
The English Poem	ENG	309	(4)
Language and Human Behavior	ENG	313	(4)
Structure of Language	ENG	320	(4)
or one sophomore level foreign language course			
American Renaissance	ENG	452	(4)
or American Realism	ENG	454	(4)
World Religions: Oriental or World Religions	PHL	210	(4)
or The Mediterranean World	PHL	211	
History of Ancient Philosophy	PHL	312	(4)
or History of Medieval Philosophy	PHL	313	
or History of Modern Philosophy	PHL	314	
Additional Core Units			(8)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Introduction to Cultural Anthropology	ANT	102	(4)
American Civilization	AMC	201 *	(4)
or Intro to American Government	PLS	201 *	
American Civilization	AMC	202 *	(4)
or U.S. History	HST	202 *	
History of Western Art	ART	212 *	(4)
History of Western Art	ART	213	(4)
Freshman Composition	ENG	104 *	(4)
Freshman Composition	ENG	105 *	(4)
Introduction to Shaespeare	ENG	203	(4)
History of Civilization	HST	101 *	(4)
History of Civilization	HST	102	(4)
History of Civilization	HST	103	(4)
Advocacy and Argument	SP	204	(4)
Survey of Music Literature	MU	104	(4)
History of England to 1689	HST	330	(4)
or History of England since 1689	HST	331	(4)
Courses to complete general education requirements (Must include 16 units in Category II, pattern 2, 4 units in Category V, and 8 units in Category VII.)			(28)
Free Electives			†(46)

Note: A minimum of 30 units of unrestricted elective credit must represent work in upper division courses. In addition, the elective courses chosen should be in areas relevant to the student's career goal.

* Designated G.E. course.

** Upper-division G.E. course (Category IV)

† The total curriculum must include 60 units of upper division courses.

LIBERAL STUDIES

John T. Hatfield, *Chair*

The major in Liberal Studies offers a diversified curriculum for those who are attracted to a nontraditional, interdisicplinary program of study. The purposes of Liberal Studies are twofold: (1) to prepare students for graduate work in such fields as law and ministry; or for work in business, human services, government, and public relations; or to pursue intellectual fulfillment for its own sake; and (2) to qualify students to teach in the public schools of California. Liberal Studies is approved by the Commission on Teacher Credentialling (Ryan Commission) as a waiver program for the multiple subject credential. This credential licenses a person to teach in a self-contained classroom, primarily in elementary schools.

Three options are available. The first is a flexible program of study which assures a breadth of education and provides opportunity for either concentration in an area of one's choice or further exploration of breadth courses. The second is the required curriculum for the teaching credential, and the third is the credential curriculum with a bi-lingual, cross-cultural (Chicano) focus.

The curriculum includes five discipline areas: English, Social Sciences, Mathematics, Physical and Life Sciences, and Humanities and Fine Arts. By taking the courses listed, the student will satisfy all General Education requirements. Elective courses may be used to satisfy all or part of the requirements for a minor in another subject, a "double" or additional major, the professional program in teacher training, or a diversified series of courses tailored to the student's own interests.

All students are assigned an advisor according to the following chart:

Advisor	*Office*	*Phone #*	*Advisees— (by first letter of last name)*
Dr. John Hatfield (or	91-5	598-4723	All Bi-lingual/Cross-cultural
Dr. D. S. Castro)	1-221	598-4722	options + non-credential opt.
Dr. Richard Suter	1-327	598-4571	(Ryan) Cred: A,B,C,D,E, & S
Dr. Bernard Lane	8-242D	598-4809	(Ryan) Cred: F,G,H,I,J,K, and T,U,V,W,X,Y,Z
Dr. Gloria Lothrop	5-243	598-4606	(Ryan) Cred: L,M,N,O,P,Q,R

Students will meet with their advisors at least once a quarter to obtain class scheduling materials and the permit to register. Advisors are available during the quarter to assist in scheduling relevant courses; to resolve problems of credit for courses completed at another college or university; to clarify procedures which might facilitate progress toward the degree; to determine which forms students must file with the university prior to taking special actions; and to help with other problems, major or minor, which might affect the student's academic life.

A handbook may be obtained from the Liberal Studies office which explains in greater detail the procedures students must follow.

CORE COURSES FOR MAJOR

(Required of all students)

Writing for the Professions	ENG	301	(4)
or Advanced Expository Writing	ENG	303	
Elective in Math or Science			(4)
Art Skills Elective	ART		(3)
Intro to Liberal Studies	LS	201	(2)
Liberal Studies Seminar	LS	401	(2)
The Visual Arts	ART	110	(4)
or Intro to the Theatre	DR	203	
or Survey of Music	MU	104	

OPTION COURSES FOR MAJOR

(required in specific options)

Liberal Studies

English Language and Lit	ENG		(12)
Foreign Language			(8)
History of Civilization	HST	101	(4)
History of Civilization	HST	102	(4)
History of Civilization	HST	103	(4)
Elective in Math/Science			(4)
Elective in Social Science			(8)

Liberal Studies—(Ryan) Credential

Structure of Language	ENG	320	(4)
Grammar of Modern English	ENG	321	(4)
Concepts of Elementary Math	MAT	207	(3)
Physical Science	SCI	212	(4)
Foreign Language			(12)
Creative Drama	DR	471	(4)
History of Civilization	HST	101	(4)
History of Civilization	HST	102	(4)
History of Civilization	HST	103	(4)
Developmental Movement	PE	328	(3)
Sociology of Minority Communities	SOC	323	(4)
or Contemp American Scene	SSC	401	
or Ethnic-Cultures in The U.S.	EWS	360	
or Soc Anthropology	ANT	358	
or Child Psychology	PSY	311	
or Interim Microecon Theory	EC	311	
or Money and Banking	EC	308	

Bi-lingual/Cross-cultural, Chicano—(Ryan) Credential

Structure of Language	ENG	320	(4)
Grammar of Modern English	ENG	321	(4)
Children's Lit	ENG	324	(4)
Concepts of Elementary Math	MAT	207	(3)
Physical Science	SCI	212	(4)
Spanish Language or Civilization	SPN		(8)
Creative Drama	DR	471	(4)
Art of Mexico	ART	219	(4)
or Music of Mexico	MU	311	
Developmental Movement	PE	328	(3)
Chicano/Hispanic Experience	EWS	202	(4)

History of California	HST	342	(4)
Geography of California	GEO	351	(4)

SUPPORT AND ELECTIVE COURSES

(required in specific options)

Liberal Studies

Pattern 1			(12)
A. Freshman Comp	ENG	104	
B. Public Speaking	SP	100	
C. Logic & Semantics	PHL	202	
or Pattern 2			
A. Freshman Comp	ENG	104	
B. Advocacy & Argument	SP	204	
C. Freshman Comp	ENG	105	
or Report Writing	COM	216	
Math and Science courses to satisfy general education Category II, Pattern 2. Must include at least one lab class.			(16)
Foreign Language			(4)
Upper Division courses to satisfy general education Category VII			(12)
Introduction to Philosophy	PHL	201	(3)
and Lower Division Seminar	PHL	151	(1)
or World Religions	PHL	210	
or World Religions	PHL	211	
Music Fundamentals	MU	100	(4)
American Civilization	AMC	201	(4)
or Intro to American Gov't	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Principles of Economics	EC	201	(4)
or Principles of Economics	EC	202	
General Psychology	PSY	201	(4)
Cultural Anthropology	ANT	102	(4)
or Principles of Sociology	SOC	201	
Unrestricted Electives (upper division: 44)			(51)

Liberal Studies—(Ryan) Credential

Freshman Composition	ENG	104	(4)
Advocacy & Argument	SP	204	(4)
Report Writing	COM	216	(4)
or Freshman Composition	ENG	105	
Intro to Modern Fiction	ENG	201	(4)
or Modern Fiction for Foreign Students	ENG	204	
or Contemporary Lit	ENG	206	
or Survey of British Lit	ENG	207	
or Survey of British Lit	ENG	208	
or Survey of American Lit	ENG	211	
or Survey of American Lit	ENG	212	
Children's Literature	ENG	324	(4)
Life Science	BIO	110	(3)
Concepts of Elementary Math	MAT	205	(4)
Concepts of Elementary Math	MAT	206	(4)
Physical Science	SCI	210	(4)
Physical Science	SCI	211	(4)
Principles of Economics	EC	201	(4)
or Principles of Economics	EC	202	
General Psychology	PSY	201	(4)
American Civilization	AMC	201	(4)
or Intro to American Gov't	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Cultural Anthropology	ANT	102	(4)
or Principles of Sociology	SOC	201	
History of California	HST	342	(4)
Geography of California	GEO	351	(4)
Introduction to Philosophy	PHL	201	(3)
and Lower Division Seminar	PHL	151	(1)
or World Religions	PHL	210	
or World Religions	PHL	211	
Music Fundamentals	MU	100	(4)
Unrestricted Electives (upper division: 25)			(42)

Bi-lingual/Cross-cultural, Chicano—(Ryan) Credential

Freshman Composition	ENG	104	(4)
Advocacy & Argument	SP	204	(4)
Report Writing	COM	216	(4)
or Freshman Composition	ENG	105	
Spanish/Hispanic Literature	SPN		(4)
Life Science	BIO	110	(3)
Concepts of Elementary Math	MAT	205	(4)
Concepts of Elementary Math	MAT	206	(4)
Physical Science	SCI	210	(4)
Physical Science	SCI	211	(4)
History of Mexico	HST	434	(4)
or History of Latin America	HST	305	
Introduction to Philosophy	PHL	201	(3)
and Lower Division Seminar	PHL	151	(1)
or World Religions	PHL	210	
or World Religions	PHL	211	
Music Fundamentals	MU	100	(4)
Spanish Language or Civilization	SPN		(4)
American Civilization	AMC	201	(4)
or Introduction to American Gov't	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Cultural Anthropology	ANT	102	(4)
or Principles of Sociology	SOC	201	
General Psychology	PSY	201	(4)
Principles of Economics	EC	201	(4)
or Principles of Economics	EC	202	
Chicano in American Political System	PLS	322	(4)
or Cultural Areas of the World (Latin American)	ANT	399	
Unrestricted Electives (upper division: 19)			(42)

LS 201 Introduction to Liberal Studies (2)

Purpose and plan of Liberal Studies and of liberal education; career opportunities and other uses; classroom work will be combined with field observation. 2 lecture-discussion.

LS 401 Liberal Studies Seminar (2)

The concept, history and philosophy of liberal education; areas of knowledge and their relationships. 2 meetings. Prerequisite: LS 201 or permission of instructor

MUSIC

Donald Ambroson, *Chair*

Susan M. Burns
Philip R. Browne
William G. Carter
Phillip C. Clarke
Stanley Gibb
David M. Grasmick
Charles E. Lindsley
James E. Mooney
Robert Simon

The department offers a variety of coursework in academic and performance aspects of music. Courses are offered for the major and minor as well as for the general university student in a wide variety of instrumental, vocal and theoretical subjects. The major in music leads to a bachelor of arts degree. The music minor is designed for students in other disciplines who desire further experience in and knowledge of music. The music minor also provides coursework which leads to a secondary emphasis in the Teacher Credential program.

The major in music provides the student with aesthetic, cultural, academic, and performance skills which will be necessary to succeed in any one of several careers in music, including the Teaching Credential program. The student must select an emphasis in one of the following areas: instrumental, vocal, composition, jazz or ethnomusicology.

Prospective music majors will be given placement exams in music theory and performance. Students who do not meet minimum requirements must take such remedial classes as are deemed necessary prior to being allowed to take classes in theory and/or studio instruction.

All music majors must be enrolled in MU 105 (Concert Attendance) and a minimum of one performance ensemble (as decided by the student's advisor) each quarter in residence. Students enrolled in instrument-use courses and music majors are required to pay a Musical Instrument Repair and Insurance Fee each quarter.

CORE COURSES FOR MAJOR

(Required of all students)

Music Appreciation	MU	104	(4)
Class Piano	MU	111	(1)
Class Piano	MU	112	(1)
Class Piano	MU	113	(1)
Studio Instruction	MU	170 series	(6)
Structure of Music	MU	201	(3)
Structure of Music	MU	202	(3)
Structure of Music	MU	203	(3)
Class Piano	MU	211	(1)
Class Piano	MU	212	(1)
Class Piano	MU	213	(1)
Music Cultures of the World	MU	215	(4)
Musicianship	MU	221	(2)
Musicianship	MU	222	(2)
Musicianship	MU	223	(2)
Structure of Music	MU	301	(3)
Structure of Music	MU	302	(3)
Structure of Music	MU	303	(3)
Instrumental Conducting & Literature *OR*	MU	307	(4)
Choral Conducting & Literature	MU	308	
Musicianship	MU	321	(2)
Musicianship	MU	322	(2)
Musicianship	MU	323	(2)
History of Music to 1750	MU	404	(4)
History of Music to 1750–1900	MU	405	(4)
History of Twentieth Century Music	MU	406	(4)
Senior Project	MU	462	(0)

All music majors must take MU 105 Concert Attendance, each quarter in residence.

SPECIALIZATION AREAS

Additional courses in choice of one of five specialization areas (Composition, Ethnomusicology, Instrumental, Jazz or Voice)	(40)
Courses to complete General Education Requirements	(72)
Unrestricted electives	(8)

COMPOSITION

Studio Instruction (Composition)	MU	178	(3)
Recording Techniques	MU	208	(2)
Orchestration	MU	306	(4)
Instrumentals Conducting & Lit.	MU	307	(4)
Choral Conducting & Literature	MU	308	(4)
Arranging	MU	309	(3)
Studio Instruction (Composition)	MU	378	(3)
Contemporary Analysis	MU	402	(4)
Composition Seminar	MU	403	(3)
Electronic Music	MU	408	(2)

The student must select 4 units from the following:

String Fundamentals	MU	231	(1)
Brass Fundamentals	MU	232	(1)
Woodwind Fundamentals	MU	233	(1)
Percussion Fundamentals	MU	234	(1)
Voice Fundamentals	MU	237	(1)

The student must select 4 units from upper division performance ensembles in the MU 351—MU 361 series (4)

ETHNOMUSICOLOGY

String Fundamentals	MU	231	(1)
Brass Fundamentals	MU	232	(1)
Woodwind Fundamentals	MU	233	(1)
Percussion Fundamentals	MU	234	(1)
Voice Fundamentals	MU	237	(1)
Orchestration	MU	306	(4)
Special Problems for Upper Division Students	MU	400	(3)
Ethnomusicology Seminar	MU	412	(4)

The student must select 12 units from the following:

Music of India	MU	216	(4)
Music of East Asia	MU	217	(4)
Music of Afro-America	MU	218	(4)
Music of Mexico	MU	311	(4)
Music in Ritual	MU	315	(4)
Music of Africa	MU	319	(4)

The student must select 12 units of performance ensembles, 6 of which are to be Ethnomusicology

Performance ..... *(12)*

INSTRUMENTAL

Recording Techniques	MU	208	(2)
String Fundamentals	MU	231	(1)
Brass Fundamentals	MU	232	(1)
Woodwind Fundamentals	MU	233	(1)
Percussion Fundamentals	MU	234	(1)
Voice Fundamentals	MU	237	(1)
Orchestration	MU	306	(4)
Studio Instruction (1 of series)	MU	370	(6)

The student must select 12 units (6 units must be upper division) from the following:

Concert Band	MU	152/352	(1)
Symphony Orchestra	MU	153/353	(1)
Concert Choir	MU	161/361	(1)

The student must select 6 units from small ensembles in the MU 340 series and 5 units from upper division music classes ..... (11)

JAZZ

History of Jazz	MU	110	(3)
Jazz Improvisation	MU	154	(1)
Recording Techniques	MU	208	(2)
Orchestration	MU	306	(4)
Arranging	MU	309	(3)
Perspectives of Jazz	MU	310	(3)
Jazz Improvisation	MU	315	(1)
Studio Instruction (1 of series)	MU	370	(6)

The student must select 12 units (6 units must be upper division) from the following:

Jazz Band	MU	154/354	(1)
Jazz Combo	MU	156/356	(1)
Vocal Jazz Ensemble	MU	165/365	(1)

The student must select 3 units from the following:

String Fundamentals	MU	231	(1)
Brass Fundamentals	MU	232	(1)
Woodwind Fundamentals	MU	233	(1)
Percussion Fundamentals	MU	234	(1)
Voice Fundamentals	MU	237	(1)

The student must select 2 units from non-jazz performance ensembles OR

Piano Accompaniment	MU	346	(1)

VOICE

Introduction to Drama	DR	125	(3)
Diction for Singers	MU	261	(2)
Song Literature	MU	262	(2)
Interpretation for Singers	MU	263	(2)
Voice Seminar	MU	277	(12)
Studio Instruction—Voice	MU	377	(6)

The student must select one unit from the following:

String Fundamentals	MU	231	(1)
Brass Fundamentals	MU	232	(1)
Woodwind Fundamentals	MU	233	(1)
Percussion Fundamentals	MU	234	(1)
Voice Fundamentals	MU	237	(1)

The student must select 12 units (6 units must be upper division) from the following:

Concert Choir	MU	161/361	(1)
Chamber Singers	MU	164/364	(1)
Opera Workshop	MU	166/366	(1)

The music major with an emphasis in VOICE must include 8 units of G.E. courses selected from: FR 101, 102 or *GER 101, 102*

MUSIC MINOR

Introduction to Theory	MU	102	(4)
Survey of Music	MU	104	(4)
Structure of Music	MU	203	(3)

Select one of the following:

History of Jazz	MU	110	(3)
World Music Cultures	MU	215	(4)

Select two of the following:

String Fundamentals	MU	231	(1)
Brass Fundamentals	MU	232	(1)
Woodwind Fundamentals	MU	233	(1)
Percussion Fundamentals	MU	234	(1)
Voice Fundamentals	MU	237	(1)

The student must select 6 units from the following:

Jazz Band	MU	141	(1)
Marching Band	MU	151	(1)
Concert Band	MU	152	(1)
Symphony Orchestra	MU	153	(1)
Concert Choir	MU	161	(1)
Ethnomusicology Performance	MU	199	(1)

Select one of the following:

Instrumental Conducting	MU	307	(4)
Vocal Conducting	MU	308	(4)

Select one of the following:

Renaissance and Baroque Music	MU	404	(4)
Classic and Romantic Music	MU	405	(4)
20th Century Music	MU	406	(4)

The student must select 3 units from the following:

Jazz Band	MU	354	(1)
Marching Band	MU	351	(1)
Concert Band	MU	352	(1)
Symphony Orchestra	MU	353	(1)
Concert Choir	MU	361	(1)
Chamber Singers	MU	364	(1)
Ethnomusicology Performance	MU	399	(1)
Total units required for minor			(33 or 34)

Course Descriptions

MU 100 Music Fundamentals (4)

Introduction to music theory for the general university student. Notation, rhythm, melody, scales, keyboard work. No previous experience required. 4 lectures.

MU 102 Introduction to Theory (4)

Introduction to music theory for the music minor. Development of proficiency in notation, rhythm, melody, scales, key signatures, intervals, chords, and keyboard work. 4 lectures.

MU 104 Music Appreciation (4)

Introduction to the great composers in Western civilization and their music. Basic forms, styles, and aesthetics of music. Records, films. 4 lectures. No previous experience required.

MU 105 Concert Attendance (0)

Attendance at and reporting of music department concerts, music hours, recitals, and musicals. Required of all music majors each quarter in residence.

MU 106 Pop Music of Today (3)

Survey of current popular music including rock, jazz, soul, jazz/rock and the latest trends. No previous experience required. 3 lectures.

MU 110 History of Jazz (3)

A survey of jazz and jazz/rock music; the assimilation of music resources and the development and evolution of the jazz idiom in the 20th century. Emphasis on the innovators who rejuvenated the idiom and inspired others in each era. Records, demonstrations, and films. No previous experience required. 3 lectures.

MU 111, 112, 113 Class Piano (1)

Beginning class piano instruction. Development of ability to play chords in all keys and to harmonize melodies using these chords. Transposition of melodies. Technical studies. Prerequisite: MU 100 or equivalent. 2 hours activity.

MU 116, 316 Jazz Improvisation (1)

Traditional, contemporary, and avant-garde techniques of improvisation. Chords, key, scales, melodic and rhythmic application, stylistic devices and procedures necessary to the development of spontaneous and creative soloistic invention in the jazz idiom. 2 hours activity. Prerequisites: MU 100, 154, or equivalent.

MU 140, 340 Chamber Music Ensembles (1)

Rehearsal and performance of small instrumental ensembles. 2 hours activity. May be repeated for a total of 8 units. Prerequisite: permission of instructor. Course offerings as follows:

141, 341 Brass Ensemble

142, 342 Woodwind Ensemble

143, 343 Percussion Ensemble

144, 344 String Ensemble

145, 345 Piano Accompaniment

Piano students accompany rehearsals and performances of student soloists and ensembles as well as vocal and instrumental fundamental classes. Required of piano majors.

MU 150, 350 Instrumental Ensembles (1)

Rehearsal and performance of instrumental ensembles. Course offerings as follows:

151, 351 Marching Band

Marching and playing for athletic events and parades. Previous experience required. Demonstrated instrumental proficiency and leadership qualities required for advanced credit. 3 hours laboratory. Total credit limited to 8 units.

152, 352 Concert Band

Training and experience in wind band repertoire, traditional and contemporary. Previous band experience and permission of instructor required. Demonstrated instrumental proficiency and leadership qualities required for advanced credit. 3 hours laboratory. Total credit limited to 12 units.

153, 353 Symphony Orchestra

Training and experience in the performance of music from all periods. Previous orchestral experience required. Open to all string players; wind players by permission of instructor only. Demonstrated leadership and solo ability required for advanced credit. 3 hours laboratory. Total credit limited to 12 units.

154, 354 Jazz Band

Study and performance of jazz, blues, rock, and related styles of music—traditional, contemporary, and avant-garde. Leadership and/or solo abilities required for advanced credit. 3 hours laboratory. Total credit limited to 12 units. Prerequisite: permission of instructor.

155, 355 Varsity Band

Performance designed primarily for rallies, sports events, and university activities. Previous experience and permission of instructor required. 2 hours activity. Total credit limited to 8 units.

156, 356 Jazz Combo

Study of small group performance of jazz, blues, rock and related styles of music—traditional, contemporary and avant garde. Leadership and/or solo abilities required for advanced credit. 3 hours laboratory. Total credit limited to 12 units. Prerequisite: permission of instructor.

MU 160, 360 Vocal Ensembles (1)

Rehearsal and performance of vocal ensembles. Course offerings are as follows:

161, 361 Concert Choir

Rehearsal and performance of choral literature for mixed voices, from all musical periods. Membership by audition only. Demonstrated vocal proficiency and leadership qualities required for advanced credit. 3 hours laboratory. Total credit limited to 12 units.

162, 362 Men's Chorus

163, 363 Women's Chorus

164, 364 Chamber Singers

Rehearsal and performance of literature for small choral ensembles of mixed voices from all musical periods. Membership by audition only. 2 hours activity. May be repeated for a total of 8 units.

165, 365 Vocal Jazz Ensemble

Study of jazz, blues, rock and related styles of music—traditional, contemporary and avant-garde. Leadership and/or solo abilities required for advanced credit. 3 hours laboratory. Total credit limited to 12 units. Prerequisite: permission of instructor.

166, 366 Opera Workshop

MU 170, 370 Studio Instruction (1)

A series of specialized individual instruction for music majors in their primary performing media as listed below. A series of 10 lessons per quarter for 1 unit of credit. In order to enroll in the 370 series one must pass departmental entrance jury. Prerequisite: music majors or permission of instructor.

171, 371 Strings

172, 372 Brass

173, 373 Woodwinds

174, 374 Percussion

175, 375 Keyboard

176, 376 Guitar

177, 377 Voice

178, 378 Composition

MU 199/399 Ethnomusicology Performance (1)

Rehearsal and performance of non-Western vocal and instrumental ensembles. 2 hours activity. Prerequisite: permission of instructor. Total credit limited to 12 units.

MU 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MU 201 Structure of Music (3)

The properties of tone; rhythm, notation, modes, scales, temperaments, and acoustics as applied to music of the medieval period. Analysis of scores and records. 3 lectures. Prerequisite: MU 102, 113, or permission of instructor.

MU 202 Structure of Music (3)

The characteristics of melody; motive and the phrase. Two and three voice modal counterpoint using Renaissance models. Analysis of scores and records. 3 lectures. Prerequisite: MU 102, or equivalent.

MU 203 Structure of Music (3)

Four voice homophonic textures. Binary and ternary forms. Functional harmony from Baroque models including secondary dominants and modulation to closely related keys. 3 lectures. Prerequisite: MU 102, or equivalent.

MU 208 Recording Techniques (2)

Study of tape recording techniques, use of recording and mixing equipment. 2 lectures.

MU 211, 212, 213 Class Piano (1)

Second year of class piano. Continued development of music reading skills and transposing; music for recreation. 2 hours activity. Prerequisite: MU 113.

MU 215 Music Cultures of the World (4)

Study of music from the major culture areas of the world utilizing the methods and approach of ethnomusicology. An introduction to the music of non-Western culture and folk traditions. Films and live performance. 4 lectures.

MU 216 Music of India (4)

Survey of the important North and South Indian styles, forms and genres of music, and their functions in Indian culture. Musical studies related to aesthetic values of the culture. 4 lectures.

MU 217 Music of East Asia (4)

The musics of China, Korea, and Japan as discrete entities reflecting indigenous traditions, and comparatively, displaying common influences. Study of general cultural considerations emphasizing the place of music in each. 4 lectures.

MU 218 Music of Afro-America (4)

Musical styles, forms, and techniques of African-derived cultures in the Western hemisphere. Cultural values and their resultant musical manifestations in Black societies in the United States, the Caribbean, and South America. 4 lectures.

MU 221, 222, 223 Musicianship (2)

Developing skills in sight-singing, rhythmic and melodic dictation, harmonic dictation, and equivalent keyboard work in support of materials and concepts discussed in structure series. Concurrent with MU 201, 202, 203 respectively (in sequence).

MU 231 String Fundamentals (1)

Fundamentals of playing string instruments; emphasis on the violin, but including viola, violoncello, bass. No previous experience required. 2 hours activity. Prerequisite: MU 100, or 102, or equivalent. May be repeated for a total of 3 units.

MU 232 Brass Fundamentals (1)

Fundamentals of playing brass instruments; emphasis on the trumpet, but including trombone, baritone, French horn, and tuba. No previous experience required. 2 hours activity. Prerequisite: MU 100, or 102, or equivalent. May be repeated for a total of 3 units.

MU 233 Woodwind Fundamentals (1)

Fundamentals of playing woodwind instruments; emphasis on the clarinet, but including flute, oboe, bassoon, saxophone, and related instruments. No previous experience required. 2 hours activity. Prerequisite: MU 100, or 102, or equivalent. May be repeated for a total of 3 units.

MU 234 Percussion Fundamentals (1)

Fundamentals of playing percussion instruments. Stick and mallet technique including membrane, metal, pitched, and non-pitched instruments. No previous experience required. 2 hours activity. Prerequisite: MU 100, or 102, or equivalent.

MU 237 Voice Fundamentals (1)

Fundamental techniques of singing. Problems of tone production, breathing, diction, repertoire, and song interpretations. 2 hours activity. May be repeated for a total of 3 units. Prerequisite: MU 100, or 102, or equivalent.

MU 251 Marching Band Techniques (1)

Techniques involved in the successful operation of a marching band; charting, drill, music selection, instrumentation, and budget. 1 lecture.

MU 261 Diction for Singers (2)

Study of the International Phonetic Alphabet and the pronunciation of the languages most often needed to perform the great song and operatic literature. Emphasis on Italian, French, German, and English diction. 2 lectures.

MU 262 Song Literature (2)

Survey of song literature available to the concert singer from the time of the troubadours to the present, with emphasis on the major Italian, French, German, English, and American repertoire. 2 lectures.

MU 263 Interpretation for Singers (2)

Performance workshop based on individual student participation in which communication through the singing voice and the special problems of the singing actor are explored in depth. 2 lecture-discussions.

MU 270 Instrumental Seminar (1)

Weekly seminar/workshop to give students an opportunity to perform for each other and encourage discussion of technique, interpretation, and style. 2 hours activity.

MU 277 Voice Seminar (1)

Weekly seminar/workshop to give voice majors an opportunity to perform for each other and offer criticism and comments enabling them to gain insights into vocal production, performance, and skills. 2 hours activity.

MU 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

MU 301 Structure of Music (3)

Baroque and Classical methods and forms. Tonal counterpoint, fugue, sonata-allegro, rondo, sonata-rondo, variations, and concerto. Analysis of scores and records. 3 lectures. Prerequisite: MU 203.

MU 302 Structure of Music (3)

Advanced harmonic techniques using Romantic and Impressionistic models. Chromatic harmony, augmented 6th chords, extreme modulations, ninth, eleventh, and 13th chords. Analysis of scores and records. 3 lectures. Prerequisite: MU 301.

MU 303 Structure of Music (3)

Twentieth-century techniques. Polytonality, atonality, serial, and Klangfarben techniques. Analysis of scores and records. 3 lectures. Prerequisite: MU 302.

MU 306 Orchestration (4)

Techniques of employing various instrumental and vocal combinations in accordance with their individual properties. A detailed study of the individual ranges, tone quality, loudness, peculiarities, limitations and standard practice of the various instruments and their families. 4 lectures. Prerequisite: MU 102 or equivalent.

MU 307 Instrumental Conducting and Literature (4)

Techniques of conducting instrumental ensembles. Analysis and study of instrumental literature of all periods and for all combinations. Lectures, listening, student projects, and practical experience. 4 lecture-discussions. Prerequisite: MU 203.

MU 308 Choral Conducting and Literature (4)

Techniques of conducting choral ensembles. Analysis and study of choral literature of all periods and for all combinations of voices. Lectures, listening, student projects, and practical experience. 4 lecture-discussions. Prerequisite: MU 203.

MU 309 Arranging (3)

Techniques of arranging; modifying existing compositions for concert band, jazz band, orchestra, small and large instrumental and vocal ensembles. 3 lectures. Prerequisite: MU 102 or consent of instructor.

MU 310 Perspectives of Jazz (3)

Study of jazz from its inception to present with emphasis on innovations, innovators, and their influences. 3 lectures. Prerequisite: MU 110.

MU 311 Music of Mexico (4)

Survey of music and dance of Mexico focusing on folk instruments and music patterns, cultural crossover between Hispanic and Indian music heritages. 4 lectures.

MU 315 Music in Ritual (4)

Ethnomusicological study of sacred and secular rituals in world music. Significance, genres, and forms of music as purely musical phenomena, and as it is related to other ritual elements. 4 lectures. Prerequisite: MU 215 or permission of instructor.

MU 319 Music of Africa (4)

Survey of sub-Saharan traditional musics exploring stylistic diversity and unity expressing values of African peoples. Consideration of pre-European and Western-influenced styles as they depict Africa's musical responses to contemporary life. 4 lectures.

MU 321, 322, 323 Musicianship (2)

Developing skills in sight-singing, rhythmic and melodic dictation, harmonic dictation, and equivalent keyboard work in support of materials and concepts discussed in Structure series. Concurrent with MU 301, 302, 303 respectively (in sequence).

MU 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MU 401 Music Literature for Children (4)

Designed to acquaint students with elementary music texts, records, and instruments used primarily in the classroom. Songs, autoharp, bells, and rhythm instruments. 4 lectures. Prerequisite: Upper division standing.

MU 402 Contemporary Analysis (4)

In-depth study of specific compositions with emphasis on 20th-century techniques, methods, forms, and concepts. Discussions and research regarding specific contemporary literature and compositional techniques. 4 lecture-discussions. Prerequisite: MU 303.

MU 403 Composition Seminar (4)

Composition and analysis of all forms in 20th-century style. Individual projects in original composition. 4 lecture-discussions. Prerequisites: MU 303, 306. May be repeated for a total of 12 units.

MU 404 History of Music to 1750 (4)

The growth of Western musical cultures from the Middle Ages through 1750. Research, listening experiences, and analysis of scores. 4 lectures. Prerequisite: MU 104 or equivalent.

MU 405 History of Music 1750 to 1900 (4)

The growth of Western musical cultures from 1750 to 1900. Research, listening experiences, and analysis of scores. 4 lectures. Prerequisite: MU 104 or equivalent.

MU 406 History of Twentieth Century Music (4)

Form, style, and idiom in Western music from 1900 to the present. Impressionism, neoclassicism, atonality, 12-tone music; music of America. Research, listening experiences, and analysis of scores. 4 lectures. Prerequisite: MU 104.

MU 408 Electronic Music (2)

Study of techniques and theories of sound modification; use of synthesizer in sound alteration, composing and live performance. 2 lectures.

MU 412 Ethnomusicology Seminar (4)

Objective methods for analyzing and describing music of specified world cultures and American sub-cultures. 4 lecture-discussions. Prerequisite: MU 215.

MU 462 Senior Recital/Project (0)

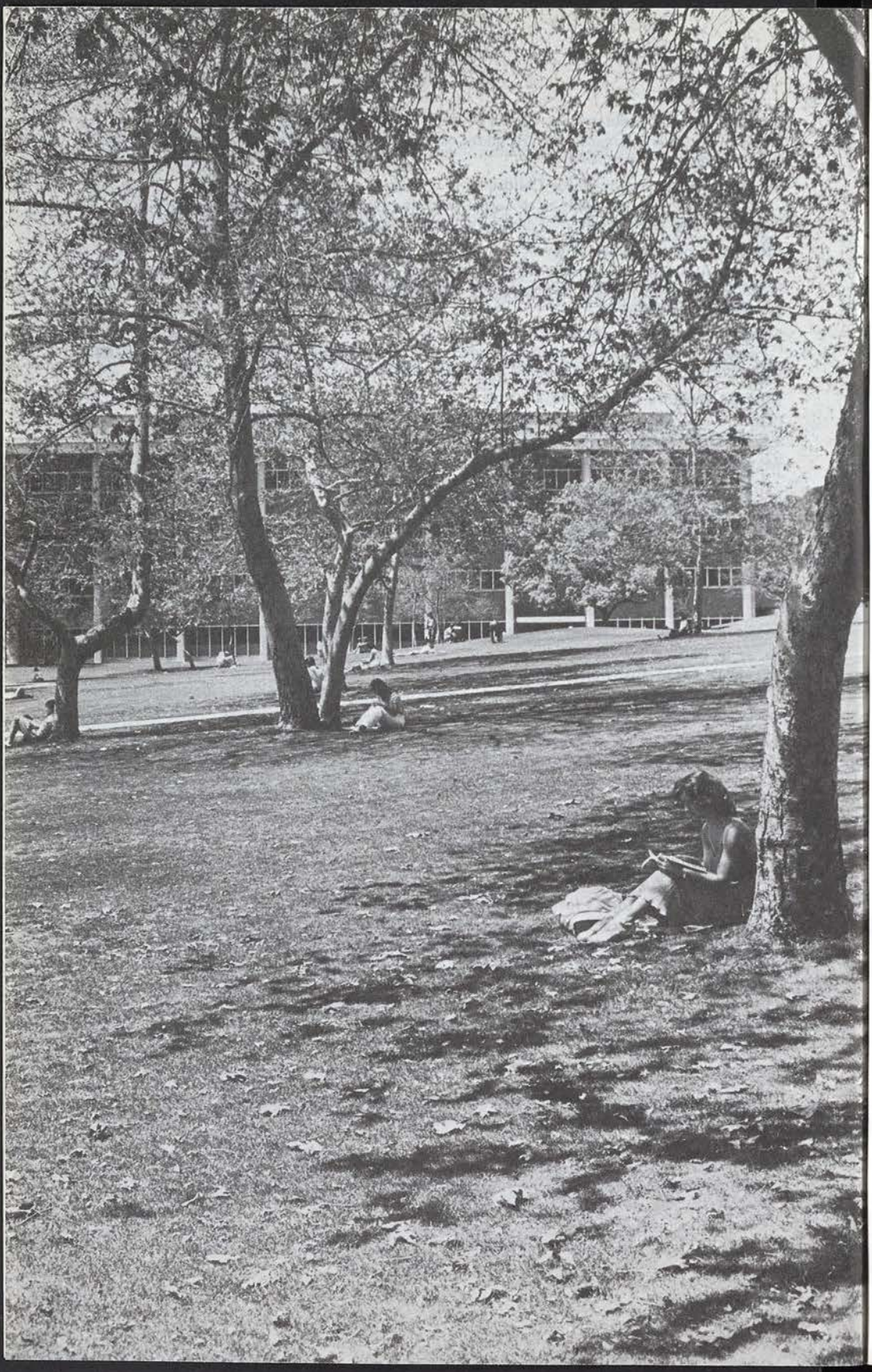
Selection and completion of a project under faculty supervision. Required of all music majors. Project shall culminate in a recital, research project or lecture/demonstration. Prerequisite: senior standing, completion of all required studio instruction coursework (170/370) or other required academic coursework necessary for successful completion of the project.

MU 463 Undergraduate Seminar (2)

An open forum of senior students in which the latest developments in music education and professional music practices are discussed. 2 lectures.

MU 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.



PHILOSOPHY

One of the four majors offered in the social sciences department is philosophy. For other programs in the department, see American studies, anthropology/geography, and social sciences.

Walter P. Coombs, *Chair,* Social Sciences Department

James C. Manley, *Coordinator*

Richard C. Richards Floyd H. Ross

The degree program is designed to provide the student with specific skills in concerned and logical thinking as the basis for rational and responsible living in a democratic society and the contemporary world. To this end all courses stress the importance of persistent critical inquiry and dialogue as central to the development of the philosophic attitude.

Courses in philosophy strengthen and enhance the value of other majors, and double majors are encouraged with other disciplines. Philosophy is a recognized field of preparation for those planning advanced degrees in college teaching, law, government, the ministry, counseling, social service, and business. The philosophy major is designed to engage the student in the core concerns of philosophy while allowing for a wide diversity of interests. Students therefore should early and often counsel with their advisors to determine their specific objectives among the wide range of possible programs of study. The student intending to pursue a higher degree in philosophy is strongly encouraged to acquire proficiency in a foreign language.

CORE COURSES FOR MAJOR

(Required of all students)

Ethics	PHL	204	(4)
Business & Prof. Ethics	PHL	205	(4)
World Religions: Oriental	PHL	210	(4)
World Religions: Mediterranean	PHL	211	(4)

16 units to be taken from among the following courses:

History of Ancient Philosophy	PHL	312	(4)
History of Medieval Philosophy	PHL	313	(4)
History of Modern Philosophy	PHL	314	(4)
Contemporary Philosophy	PHL	315	(4)
Great Philosophers	PHL	318	(4)
Nineteenth Century Philosophy	PHL	319	(4)
American Philosophy	PHL	320	(4)
Existentialism	PHL	469	(4)

In addition, each student in consultation with his advisor will complete 24 units of upper division philosophy units. Acceptable for upper division philosophy credit are ENG 313, HST 470, and no more than 8 units of PLS 405, 432, 435, or 490.

SUPPORT & DIRECTED COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Intro to Physical Anthropology	ANT	101	(4)
Intro to Cultural Anthropology	ANT	102	(4)
or			
Principles of Sociology	SOC	201	
Principles of Economics	EC	201	(4)
Freshman Composition	ENG	104	(4)
Freshman Composition	ENG	105	(4)
Cultural Geography	GEO	102	(4)
History of Civilization	HST	101	(4)
History of Civilization	HST	102	(4)
History of Civilization	HST	103	(4)
Foundation of Physical Activity	PE	203	(3)
Public Speaking	SP	100	(4)
Logic and Semantics	PHL	202	(4)
* Courses to complete General Education Requirements			(44)

* Must include laboratory science course and 12 upper division units, 4 of which replace lower division units in Category II or III.

Free Electives	(39)

The total curriculum must include 60 units of upper division courses.

PHILOSOPHY MINOR

May be taken by Social Science Majors.

Required:

Logic and Semantics	PHL	202	(4)

Three of the following courses:

History of Ancient Philosophy	PHL	312	(4)
History of Medieval Philosophy	PHL	313	(4)
History of Modern Philosophy	PHL	314	(4)
Contemporary Philosophy	PHL	315	(4)
Great Philosophers	PHL	318	(4)
Nineteenth Century Philosophy	PHL	319	(4)
Units Required:			(12)

Any sixteen units of the following upper division courses:

Philosophy of the Arts	PHL	301	(4)
American Indian Thought and Religion	PHL	306	(4)
American Indian Thought and Religion	PHL	307	(4)
Contemporary Ethical Problems	PHL	309	(4)
American Philosophy	PHL	320	(4)
Philosophy and Religion of Japan	PHL	401	(4)
Philosophy and Religion of China	PHL	402	(4)
Philosophy and Religion of India	PHL	403	(4)
Philosophy of Freedom and Order	PHL	410	(4)
Philosophy of Justice	PHL	415	(4)
Medical Ethics	PHL	433	(4)
Epistemology	PHL	459	(4)
Metaphysics	PHL	460	(4)
Existentialism	PHL	469	(4)
Myth, Symbol, and Ritual	PHL	470	(4)
Film Aesthetics	PHL	472	(4)
Social Philosophy	PHL	480	(4)
Total Units Required			(32)

Course Descriptions

PHL 151 Lower Division Seminar (1)

An open forum of students interested in Introduction to Philosophy who desire to do special research on a topic chosen in consultation with the instructor. Written report required. 1 lecture-discussion.

PHL 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PHL 201 Introduction to Philosophy (4)

Investigation of basic concepts and methods of philosophy; selected metaphysical, epistemological, ethical, aesthetic, and logical problems and issues traditional to philosophy, with emphasis on their relevance for intelligent living. 4 lecture-discussions.

PHL 202 Logic and Semantics (4)

Inductive and deductive processes in reasoning; the effects of semantic considerations on reasoning and communication, with examples from contemporary society. Emphasis on detection and avoidance of logical and semantic errors. 4 lecture-discussions.

PHL 203 Introduction to the History of Philosophy (4)

Major figures and themes in the history of Western philosophy, including not only their contributions to the development of philosophy, but also their influence on the arts, sciences, and literature. 4 lecture-discussions.

PHL 204 Ethics (4)

The implications of ethics and ethical systems. The meaning of right and wrong, good and bad, obligation. Sanctions and sources of morality. Inquiry into the principles of the morality of human actions. Ethical foundations of personal and social relations. 4 lecture-discussions.

PHL 205 Business and Professional Ethics (4)

Analysis of current crises in business and professional ethics including kickbacks, bribes and whistleblowing examined in the light of contemporary ethical theory. 4 lecture-discussions.

PHL 210 World Religions: Oriental (4)

Living religions of India, China, and Japan; men, movements, and ideas and their relevance to modern man, including developments in the 20th century. 4 lecture-discussions.

PHL 211 World Religions: Mediterranean World (4)

Living religions of the Mediterranean world: Zoroastrianism, the Hebrew-Jewish religion, Christianity, Islam; men, movements, and ideas, including developments in the 20th century. 4 lecture-discussions.

PHL 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory or a combination of both.

PHL 301 Philosophy of the Arts (4)

Investigation of the nature of art, aesthetic experience, beauty, and the standards upon which aesthetic judgments are based. Concepts common to the various artistic disciplines; problems in specific areas in architecture, the graphic arts, music, and literature. 4 lecture-discussions.

PHL 303 Philosophy of Religion (4)

Nature and grounds of religious experience, both Oriental and Occidental; such problems as man's concept of himself, his gods, his anxiety, evil; the relation of religious faith to science and human behavior. 4 lecture-discussions.

PHL 306 American Indian Thought and Religion (4)

Philosophical and religious beliefs and practices of the Indians of Canada and the Eastern woodlands, including the Great Basin and the Pueblos. Their history; views of man, and nature, and the universe; ceremonies and rituals; contributions to our cultural heritage. 4 lecture-discussions.

PHL 307 American Indian Thought and Religion (4)

Philosophical and religious beliefs and practices of the tribes of the Pacific coast, the Southwest, and the plains. Their history; views of man, nature, and the universe; ceremonies and rituals; contributions to our cultural heritage. 4 lecture-discussions.

PHL 309 Contemporary Ethical Problems (4)

Critical application of ethical norms to current social problems such as the threat of nuclear warfare, the civil rights revolution, drugs, crime and punishment, pornography, abortion, birth control, business practices, ecology. Empirical investigation by small groups. 4 lecture-discussions.

PHL 312 History of Ancient Philosophy (4)

Examination of the philosophical ideas of the Greek, Roman, and early medieval worlds, from the pre-Socratic philosophers to St. Augustine. 4 lecture-discussions.

PHL 313 History of Medieval Philosophy (4)

Examination of the philosophical ideas of the medieval and Renaissance worlds, from St. Augustine to Descartes. 4 lecture-discussions.

PHL 314 History of Modern Philosophy (4)

Great philosophical ideas and thinkers from Descartes to the 20th century; Continental and British schools. 4 lecture-discussions.

PHL 315 Contemporary Philosophy (4)

Philosophical movements of the 20th century, including modern idealism, positivism, pragmatism, existentialism, dialectical materialism, phenomenology, and ordinary language analysis. 4 lecture-discussions.

PHL 318 Great Philosophers (4)

Study in depth of a great philosopher, with attention devoted to source materials. May be repeated for credit by permission of instructor. 4 lecture-discussions.

PHL 319 Nineteenth-Century Philosophy (4)

Philosophical trends during the 19th century, including the Kantian heritage, the idealism of Fichte, Schelling, and Hegel; utilitarianism as introduced by Bentham and revised by Mill; and the positivism of Comte. 4 lecture-discussions.

PHL 320 American Philosophy (4)

The lively and varied growth of American thought, from the Puritans through the personalists to the pragmatists: Edwards, Peirce, James, Royce, Santayana, Dewey, Whitehead. 4 lecture-discussions.

PHL 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PHL 401 Philosophy and Religion of Japan (4)

Traditional ways of thought in Japan. Modifications in Shinto from its beginnings through the impacts of Buddhism and Confucianism; its reemergence in the 19th century. Twentieth-century developments and the emergence of the "new religions." 4 lecture-discussions.

PHL 402 Philosophy and Religion of China (4)

Development of religious and philosophical thought in China with special reference to Confucianist, Taoist, and Buddhist schools of thought. 4 lecture-discussions.

PHL 403 Philosophy and Religion of India (4)

The diversity of the philosophy and religion of India from Rig Vedic times to the 20th century. Development of the Upanishads, Yoga systems, the great epics, the bhakti movements; emergence of Jainism, Buddhism, Sikhism, Indian Islam. 4 lecture-discussions.

PHL 410 Philosophy of Freedom and Order (4)

Traditional and contemporary views of concepts of freedom and order in the making and preservation of the state; from Plato and the classicists to Marx and modern revolutionaries. 4 lecture-discussions. Prerequisites: PHL 211 or 212 or 213; PLS 431 or 432; or permission of instructor.

PHL 415 Philosophy of Justice (4)

An examination of the meanings of justice—biblical, Greco-Roman, medieval, and modern: with particular attention to the rise of law and its institutions, the role of dissent and the right of revolution in the processes of change, and the justification and limits of violence. 4 lecture-discussions.

PHL 433 Medical Ethics (4)

The more vexing ethical questions created by the new medical technology—euthanasia, definition of death, genetic screening, abortion, allocation of exotic medical support systems, experimentation on human subjects, mind control—examined in the light of contemporary ethical theory. 4 lecture-discussions.

PHL 459 Epistemology (4)

Nature, kinds, and degrees of certitude, truth, freedom. How knowledge is acquired: nature of opinion; methods of philosophy and science; kinds of evidence. From the viewpoints of skepticism, realism, existentialism, and empiricism. 4 lecture-discussions.

PHL 460 Metaphysics (4)

Speculative issues that have been central to philosophy throughout its history: the mind-body problem, the nature of the self, the reality of permanence and change, freedom versus determinism. 4 lecture-discussions.

PHL 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Formal report required. Minimum 120 hours total time.

PHL 463 Undergraduate Seminar (2)

An open forum of senior students in which the latest developments, practices, and procedures are discussed. Development and presentation by students of topics in their chosen fields. 2 lectures.

PHL 465 Philosophy of Love and Sex (4)

Definitions of love, connections between love and sexuality. Selected problems related to sex and sex roles. Ethical dimensions of love and sexuality. Four lectures.

PHL 469 Existentialism (4)

Basic ideas of existentialist philosophers of the 19th and 20th centuries; a comparison of theistic and atheistic existentialism; existentialist ideas of anxiety, freedom, and responsibility. 4 lecture-discussions.

PHL 470 Myth, Symbol, and Ritual (4)

Major mythic themes in both Eastern and Western cultures. Ritual practices and symbolic transformation as part of man's search for orientation. Contemporary relevance of mythic and symbolic factors. Offered in odd-numbered years. 4 lecture-discussions.

PHL 472 Film Aesthetics (4)

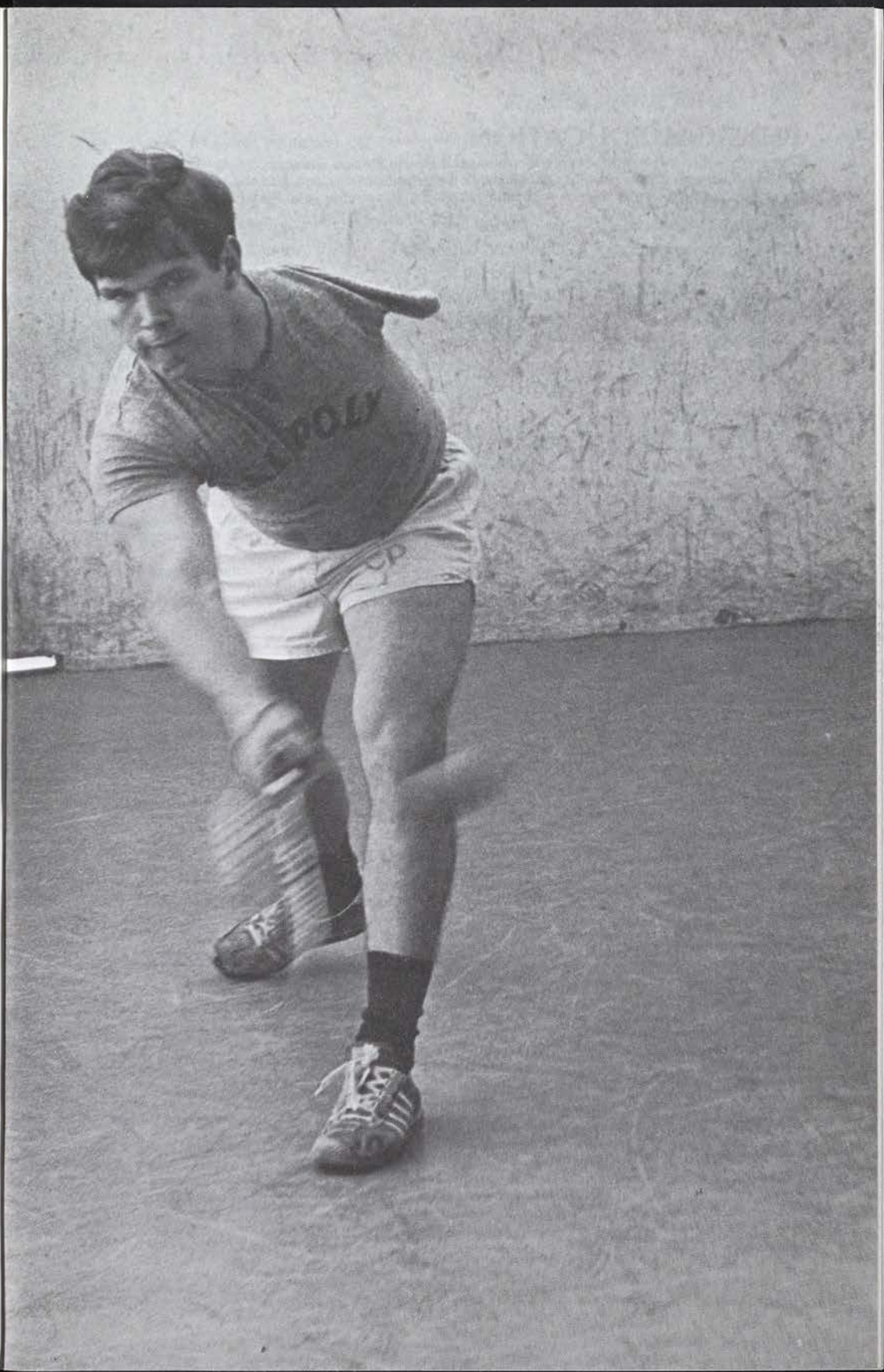
Topical approach to film aesthetics; role of myth, psychology, literature, politics, science-fiction, and the popular arts in the aesthetics value of film. Films will be primarily from local sources. 3 lecture-discussions. 2 hours activity.

PHL 480 Social Philosophy (4)

Morality of human acts in their social setting. The essential and existential nature of the true society. Causes and functions of society as rooted in and developed from the causes and functions of the human person. Offered in even-numbered years. 4 lecture-discussions.

PHL 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.



PHYSICAL EDUCATION

One of the two majors offered in the Department of Health, Physical Education, Recreation, and Dance is physical education. For the other program offered in the department, see recreation administration.

Stanley L. Bassin, *Chair*

Barbara Anderson
V. Barney Anooshian
Bruce Coulter
Raymond C. Daugherty
Roy C. Easley
George Eisen
Lynne Emery
Aubrey Fine
Barbara H. Ford
Jack B. Frost
Otto F. W. Gasser
Gus J. Gerson Jr.
Donald L. Halderman
Leon S. Jackson
Frank D. Lansford
Gregory H. Marks
G. S. Don Morris
Mary Jo Oliver
Arthur Ridgway
John H. Scolinos
Ann Stabolepszy
Jim Stiehl
Robert B. Stull
Leo H. Teghtmeyer
Donald E. Warhurst

The department offers a uniquely balanced program for students majoring in physical education. A set of required core courses stressing general professional preparation followed by optional areas of specialized professional education allows students to select groups of courses aimed at meeting their individual vocational needs. This approach allows the department to prepare qualified students for various teaching experiences in physical education, health and dance. In-depth specializations may lead students to Physical Education Department certification in adapted physical education, athletic training, coaching and dance. The department also offers a curriculum leading to a Master of Science degree in Physical Education. Requirements for this program will be found in the graduate listings.

The department curriculum also provides required and elective courses in physical education and health to meet the general education needs of all students and operates an intramural sports program.

Courses for the Recreation Administration major are listed under that heading.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to P.E.	PE	201	(4)
First Aid	PE	205	(3)
Introduction to Adapted Physical Education	PE	206	(3)
History of P.E.	PE	210	(4)
or Philosophy of P.E.	PE	310	(3)
Anatomical Kinesiology	PE	302	(4)
Physiology of Exercise	PE	303	(4)
Motor Development	PE	312	(4)
Tests and Measurements	PE	425	(4)
Motor Learning	PE	430	(4)
Senior Seminar	PE	463	(4)
Human Anatomy	ZOO	234	(4)
Designated PE—Area I, II, or III			(38)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Freshman Composition	ENG	104	(4)
Public Speaking	SP	100	(4)
Logic & Semantics	PHL	202	(4)
Intro to Statistics	STA	107	(4)
Fund of Chemistry	CHM	103	(4)
or Fund of Physics	PHY	102	
or Fund of Earth Science	ESC	101	
Basic Biology	BIO	115	(5)
Human Physiology	ZOO	235	(4)
Intro to Dance	PE	202	(4)
Intro to Philosophy etc.	PHL	201	(3)
plus lower division semin.	PHL	151	(1)
or Ethics	PHL	204	
or Business & Professional Ethics	PHL	205	
Principles of Sociology	SOC	201	(4)
or Introduction to Ethnic Studies	EWS	140	
Ex, Nutrition, Fit for Contemp Soc	CPU	201	(4)
or Health Education & Nutrition	CPU	202	
or Living & Dying	CPU	210	
Contemporary Aspects of Nutrition	FN	205	(4)
* G.E. Elective Area IIIC			(4)
* G.E. Elective Area IVA			(4)
* G.E. Elective Area IVC			(4)
8 units of approved G.E. upperdivision work (theme or depth)			(8)
Free Electives			(41–42)

* Select one G.E. course from each: IIIC, IVA, and IVC (one must be upper division)

Course Descriptions

PE 100 Adaptive Activities (1)

Group and individual exercise designed to aid students with injury or posture, body mechanics, cardiac, pregnancy, or other medical conditions. May be taken upon recommendation of University physician. Fulfills general education requirements. 2 one-hour activities.

PE 101–179 Physical Education (1)

Activities involving physical fitness, aquatics, dance, and individual and team sports. Emphasis on lifetime sports attempting to develop an understanding of the interaction of the physical and social aspects of activity within the culture. 2 one-hour activities. May be repeated for additional credit as long as normal academic progress is maintained.

101 Backpacking
102 Basketball
104 Baseball
105 Bicycling
106 Bowling
107 Creative Games
108 Folk Dance
109 Mexican Dance
110 Square Dance
111 Social Dance
112 Fencing
113 Field Hockey
114 Figure Control
117 Football Conditioning
118 Handball
119 Jogging
120 Pep Squad
121 Physical Fitness
122 Scuba Beach
123 Self-Defense
124 Ski Conditioning
125 Skin Diving
126 Soccer
128 Softball
129 Springboard Diving
131 Tumbling and Trampoline
132 Wrestling
133 Racquetball
134 Innertube Water Polo
136 Skiing
145 Beginning Archery
147 Beginning Badminton
148 Advanced Badminton
155 Beginning Tap Dance
157 Beginning Golf
158 Advanced Golf

159 Beginning Gymnastics

160 Advanced Gymnastics

161 Beginning Swimming

162 Advanced Swimming

163 Beginning Volleyball

164 Advanced Volleyball

165 Beginning Weight Training

166 Advanced Weight Training

167 Beginning Tennis

168 Intermediate Tennis

169 Advanced Tennis

170 Advanced Fencing

179 General Activity

PE 180 Dance Production Techniques (2)

Emphasis on production aspects of dance presentations including management, publicity, lighting and costume design, through lecture and involvement in a dance production. 1 lecture, 2 hour activity.

PE 181–195 Competitive Athletics (2)

May be taken by those students who compete on an intercollegiate athletic team.

182 Intercollegiate Baseball

183 Intercollegiate Basketball

185 Intercollegiate Cross Country (Men)

186 Intercollegiate Soccer (Men)

187 Intercollegiate Gymnastics

188 Intercollegiate Softball

190 Intercollegiate Tennis (Men)

191 Intercollegiate Track & Field (Men)

192 Intercollegiate Volleyball (Women)

193 Intercollegiate Cross County (Women)

194 Intercollegiate Tennis (Women)

195 Intercollegiate Track and Field (Women)

PE 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PE 201 Introduction to Physical Education (4)

Introduction and orientation to physical education as a profession. 3 lectures, 1 two-hour activity.

PE 202 Introduction to Dance (4)

A course designed to create an understanding of all dance activities through rhythmic participation, field trips, and audio-visual experiences. 3 lectures, 1 two-hour activity.

PE 203 Foundations of Physical Activity (3)

Examination of the values of physical activity for adults. Rationale for, development of, and participation in various types of adult exercise programs. Evaluation of health and fitness-related factors including obesity, muscular strength and endurance, flexibility, and circulorespiratory function. 2 lectures, 2 one-hour activities.

204 Field Work for Prospective Physical Education Teachers (3)

Observation in elementary and secondary physical education programs in advance of student teaching experience. 1 lecture, 2 two-hour activities.

PE 205 First Aid (3)

A standard, advanced, and instructors' American Red Cross first aid course. Instruction and practice in the immediate and temporary care of injuries and sudden illness. 2 lectures, 1 two-hour activity.

PE 206 Introduction to Adapted Physical Education (3)

Teaching physical education to persons with handicapping conditions. Types of conditions and program adaptations. Opportunities for observation of selected ideal programs and thorough discussion of mainstreaming. 3 lectures.

PE 207 Health Education (3)

Investigation of concepts, theories, and principles, which may promote the development of attitudes, practices, and behaviors for optimum physical and mental well-being. 3 lectures.

PE 210 History of Physical Education (4)

Development of physical education from earliest times to the present. Concentration on political, religious, and social bases of societies and the effect of these beliefs on the physical activity of each culture. Emphasis on the United States. 4 lectures.

PE 212 Basketball, Field Hockey, and Soccer Theory (3)

Techniques and skills of teaching basketball, field hockey, and soccer with application to professional needs. Instruction includes mainstreaming of handicapped students. 6 hours activity. Prerequisites: PE 103, 113, and 126 with grade of A or B, or permission of instructor.

PE 213 Weight Training, Archery, and Swimming Theory (3)

Techniques and skills of teaching weight training, archery, and swimming with application to professional needs. Instruction includes mainstreaming of handicapped students. 6 hours, activity. Prerequisites: PE 145, PE 161, and PE 165 with grades of A or B, or permission of instructor.

PE 214 Tumbling, Apparatus, and Volleyball Theory (3)

Techniques and skills of tumbling, apparatus, and volleyball with application to professional needs. Instruction includes mainstreaming of handicapped students. 6 hours activity. Prerequisites: PE 131, 163 with grade of A or B, or permission of instructor.

PE 215 Badminton, Golf and Tennis Theory (3)

Techniques and skills of badminton, golf, and tennis with application to professional needs. Instruction includes mainstreaming of handicapped students. 6 hours activity. Prerequisites: PE 147, 157, 167 with grade of A or B, or permission of instructor.

PE 216 Softball, Flag Football, and Track and Field Theory (3)

Analysis and strategy of teaching softball, flag football, and track/field with application of principles. Instruction includes mainstreaming of handicapped students. 6 hours activity. Prerequisites: PE 115, 128, and 130 with grade of A or B, or permission of the instructor.

PE 221 Wrestling Theory (3)

Analysis of strategy and skill of wrestling with application of principles. 2 lectures, 1 two-hour activity.

PE 231 Basic Scuba (4)

Use of scuba apparatus and its application in the underwater environment. Leads to certification in scuba diving. 2 lectures, 2 two-hour activities. Prerequisites: swim test; permission of instructor; must have a current physical examination from campus health center during the quarter break prior to enrollment.

PE 232 Scuba Safari (2)

Introduction to diving environments in California. 10 lectures, 20 hours of activity by arrangement. Prerequisites: basic scuba certification, permission of instructor; must have a physical examination from campus health center during the quarter break prior to enrollment.

PE 255 Regional Dances of Mexico (3)

An introduction to the cultural aspects and skills of the regional dances of Mexico, including rhythms analysis. Emphasis on the application of motor learning. 2 lectures, 1 two-hour activity.

PE 260 Dance Composition (4)

Analysis of preclassic sectional variation, developmental, free, and fugal dance forms, and rhythmic fundamentals. Development of simple dance patterns. 2 lectures, 2 two-hour activities.

PE 275 Gymnastics Theory (3)

Analysis of strategy and skill of gymnastics with application of principles. 2 lectures, 1 two-hour activity. Prerequisite: PE 159.

PE 280 Beginning Jazz Dance (2)

Performance of fundamental jazz patterns to contemporary music. 2 two-hour activities.

PE 281 Advanced Jazz Dance (2)

Performance of advanced movement patterns to contemporary music. 2 two-hour activities. Prerequisite: PE 280 or permission of instructor.

PE 282 Beginning Modern Dance (2)

Classical modern techniques based on Graham and Newman theories of movement and use of energy. Techniques performed on the floor, standing, and across the floor. 2 two-hour activities.

PE 283 Advanced Modern Dance (2)

Advanced classical modern techniques based on Graham and Newman theories of movement and use of energy. Emphasis on pattern combinations. 2 two-hour activities. Prerequisite: PE 282 or permission of instructor.

PE 284 Beginning Ballet (2)

Basic ballet techniques with emphasis on alignment and placement. Classical progressions at the bar and floor. 2 two-hour activities.

PE 285 Advanced Ballet (2)

Advanced ballet techniques with emphasis on extending movement range through correct placement. 2 two-hour activities. Prerequisite: PE 284 or permission of instructor.

PE 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

PE 300 Safety Education (3)

Principles and practices of safety as applied to home, industrial, school, community, fire, and traffic situations; accident prevention. 3 lectures.

PE 302 Anatomical Kinesiology (4)

Interrelationships of the body segments and the action of the joints and muscles involved in human movement; application of the principles of movement for the analysis and evaluation of selected physical education activities. 4 lectures. Prerequisite: a course in human anatomy.

PE 303 Physiology of Exercise (4)

Effects of physical activity upon the circulatory, respiratory, and other physiological systems. Relationship of strength, coordination, flexibility, endurance, fatigue, conditioning, and related factors to human movement and athletic performance. 3 lectures, 1 two-hour activity. Prerequisite: ZOO 235.

PE 306 School and Community Health (2-4)

Methods, processes, and content in teaching health education in the public schools. Designed to meet requirements of Title V, Section 13132.5 in health education.

PE 307 The School and Sex Education (4)

Development and conduct of sex education in the public schools; factors in human growth and sexuality; decision making, family health problems, parenthood, and family planning. 3 lecture-discussions, 1 two-hour activity. Prerequisites: PE 207, ZOO 234, 235, PSY 201.

PE 308 Drug Education (4)

Drugs in contemporary society; drug abuse; controlling factors; federal and state drug laws. 4 lecture-discussions. Prerequisites: PE 207, PSY 201.

PE 310 Philosophy of Physical Education (3)

The nature, significance, and development of sport and physical education and their place in human society as related to the major philosophical systems. 3 lectures.

PE 312 Motor Development (4)

Growth and physical development from birth through adulthood with emphasis on changing motor abilities related to play and exercise. 4 lectures. Prerequisites: SOC 201, PSY 201.

PE 316 Adapted Physical Education (4)

Concentrated study of various handicapping conditions and programs best suited to meet individual needs. 3 lectures, 1 two-hour lab. Prerequisites: PE 206 or equivalent; or permission of instructor.

PE 318 Movement Analysis for Dancers (3)

Physical and aesthetic factors that shape dance movements. Analysis of demands of dance technique, specifically movement style and quality. Examination of students' movement styles, habits, and methods of improving dance performance.

PE 321 Football Theory (3)

Analysis of strategy and skill in football with application of principles. 2 lectures, 1 two-hour activity.

PE 323 Baseball and Softball Theory (3)

Analysis of strategy and skill in baseball and softball with application of principles. 2 lectures, 1 two-hour activity.

PE 325 Basketball Theory (3)

Strategy and skill in basketball with application of principles. 2 lectures, 1 two-hour activity.

PE 326 Coaching Theory of Field Hockey (3)

Strategies and tactics for field hockey at the interscholastic and intercollegiate levels. Systems play, positional play, and special situations as applied to attack and defense. 2 lecture/discussions, 1 two-hour activity. Prerequisites: competitive experience or consent of instructor.

PE 327 Theory of Coaching Competitive Volleyball (3)

Analysis and techniques for developing intermediate and advanced skills and strategies. Development of practice sessions and training/conditioning programs. Coaching tactics for practice and game situations. 2 lecture/discussions, 1 two-hour activity. Prerequisites: competitive experience or consent of the instructor.

PE 328 Developmental Movement for Children (3)

Preparation to conduct physical education programs and activities at elementary school level. Analysis of basic skill movements used in rhythms, sports, gymnastics, and games; principles of exercise physiology, biomechanics, and motor development. 2 lectures, 1 two-hour activity.

PE 333 Track and Field Theory (3)

Analysis of strategy and skill in track and field with application of principles. 2 lectures, 1 two-hour activity.

PE 337 Sports Officiating (4)

Analysis of principles and techniques of officiating sports offered in the school program. 2 lectures, 2 two-hour activities.

PE 341, 342, 343 Direction of Physical Education Activity (1) (1) (1)

Experience in the supervision of physical education classes under the direction of the faculty. 2 one-hour activities.

PE 347 Folk and Square Dance Theory (3)

Theory, analysis, philosophy of folk and square dance; their place in our educational system. 2 lectures, 1 two-hour activity. Prerequisites: PE 108, 110 with grade of A or B, or permission of instructor.

PE 350 Intramural Sports (3)

Principles, policies, and procedures underlying the program of intramural sports in institutions of elementary, secondary, and higher education. 2 lectures, 1 two-hour activity.

P.E. 355 Adapted Aquatics (3)

Theory and practical aspects of teaching swimming and water related activities to the needs of special populations, including movement exploration principles/mechanics, self-adaptations, facility and equipment aids, administrative considerations, and research. 2-hour lecture, 2-hour lab. Prerequisites: PE 206 or consent of instructor.

P.E. 357 Water Safety Instructor, Life Saving and C.P.R. (4)

Study and practice of water safety instruction, life saving techniques, cardiopulmonary resuscitation, beach and pool lifeguard techniques. Includes canoe safety, skin diving, and use of safety flotation devices. 2 lectures, 2 two-hour activities. Prerequisite: Permission of instructor.

PE 360 Water Sports Theory (4)

Theory and analysis of competitive swimming. Includes swim conditioning and training techniques, diving, and water polo skills and strategies. Oriented to needs of swim coaches working in competitive swim programs at all age levels. 2 hour lecture, 2 two-hour activity.

PE 379 Advanced Scuba Techniques (4)

Advanced knowledge and skill in scuba diving. 2 lectures, 2 two-hour activities. Prerequisite: PE 231, or permission of instructor, and must have a current physical examination from the campus health center during the quarter break prior to enrollment.

P.E. 380 Exercise Science (4)

Scientific principles applied to teaching dance and sports. Designed for non-physical education majors seeking a dance or coaching specialization for all skill levels and authorization for the coaching certificate or the subsumed areas of sport and games. Not open for credit for P.E. majors. 4 lectures.

PE 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PE 402 Biomechanical Kinesiology (3)

Introduction to biomechanical analysis of sport. Concepts involving fundamental physics required to describe human performance in a non-mathematical framework. 3 lectures. Prerequisites: PE 302; PHY 102 or 121.

PE 403 Physiology of Exercise II (4)

Influence of performance by muscle fiber type, environmental temperature, altitude, warm-up, nutrition, endocrine system, ergogenic aids, and rapid weight loss on performance. Exercise for females and handicapped. Influence of exercise on health and aging. Assessing circulatory function, oxygen consumption and efficiency in laboratory. 3 lectures, 2 hour activity. Prerequisite PE 303.

PE 404 Rhythms and Dance for Movement Education (3)

Dance and rhythmic programs basic to development of movement patterns in normal and atypical individuals. Foundations of dance curriculum for different levels of motor development. 2 lectures, 2 hours activity. Prerequisite: PE 328 or permission of instructor.

PE 405 Adapted Physical Education Fieldwork (3)

Fieldwork in adapted physical education. Supervised clinical and mainstreamed public school experience in adapted physical education at selected public school sites and within Cal Poly's motor development clinic. May be repeated three times for a total of 9 units. 1 hour lecture, 2 two-hour activities.

PE 406 Physical Education for the Orthopedically Handicapped (4)

Techniques for developing and implementing a physical activity program for the orthopedically handicapped person. Special emphasis on problems and programs for orthopedic units in a school setting. 3 lectures, 1 two-hour activity. Prerequisites: PE 312, 316, or graduate standing, or permission of instructor.

PE 407 Environmental Health (4)

The nature and effect of environmental pollutants on the health, welfare, and survival of man. 4 lectures.

PE 408 Physical Education for the Learning Handicapped (4)

Analysis of physical activity programs as a medium for aiding the development of mildly retarded learning disabled, and mildly emotionally disturbed child in the affective, cognitive, and motor domains. Emphasis on assessment procedures and task analysis. 3 lectures, 1 two-hour activity. Prerequisites: PE 312, 316 or graduate standing, or permission of instructor.

PE 410 Physical Education for the Severely Handicapped (4)

Etiology of movement characteristics and learning problems of profoundly mentally handicapped and severely emotionally disturbed persons, 3 lectures, 1 two-hour activity. Prerequisite: PE 312, 316 or permission of instructor.

PE 420 Administration of Physical Education and Athletics (4)

Underlying philosophy and principles of administrative theory and practice. Legal aspects and safety policies for athletics and physical education programs. 4 lectures. Prerequisite: upper division standing or permission of instructor.

PE 425 Tests and Measurements in Physical Education (4)

Techniques and principles in assessing the outcomes of instruction and participation in physical education. Emphasis on the selection, preparation, administration, and application of standardized evaluative instruments. 3 lectures, 1 two-hour activity. Prerequisite: upper-division standing.

PE 428 Coaching Psychology in Athletics (4)

Analysis and evaluation of literature concerned with the training and motivation of secondary- and college-level athletic performers. Prerequisite: senior standing or previous secondary or college coaching experience. 4 lecture-discussions.

PE 430 Motor Learning and Human Performance (4)

Scientific analysis of the perceptual and sensory systems involved in physical activity. The role of kinesthesis, reaction time, and strength in neuro-motor coordination and motor learning; transfer factors affecting motor performance. 3 lectures, 1 two-hour activity. Prerequisites: PE 303, 425; or permission of instructor.

PE 432 Athletic Training (4)

Prevention, examination, and care of athletic injuries; methods of taping and bandaging; therapeutic exercises applied to athletic injuries. Diets, training room equipment, protective devices, and supplies. 3 lectures, 1 two-hour activity. Prerequisites: PE 406 and senior standing; or permission of instructor.

PE 433 Advanced Athletic Training (3)

Advanced methods for prevention, examination, evaluation, and rehabilitation of athletic injuries; advanced taping techniques; diets; fitting of protective pads and equipment. 3 lectures. Prerequisites: PE 205, 302, 303, 432; ZOO 234, 235.

PE 434 Athletic Training Practicum (2)

Practical experience in an athletic training facility under the direction of a certified athletic trainer. 40 hours per quarter. May be taken a maximum of three quarters. Prerequisite: permission of instructor.

PE 440 The Physical Education Curriculum (4)

The construction and implementation of programs emphasizing current and future curriculum planning to facilitate student, school and community needs. Unit planning, behavioral objectives, co-educational and inter-scholastic programs, curriculum models, and purpose-process curriculum framework. 4 lectures. Prerequisite: PE 204, upper-division standing.

PE 446 Dance History (4)

The place of dance in various cultures throughout the world from paleolithic times through pre-classic forms to the non-literal dance of today. 4 lecture-discussions.

PE 449 Dance in Art and Education (4)

Human movement experiences through dance and its place in education and society; concepts of art exemplified in dance; elements of art criticism applied to dance production; the place of dance in education. 4 lectures.

PE 450 Role of Sport in Contemporary Society (4)

Contemporary sports and athletics as they affect man's socio-cultural development and value system; interrelationship with other aspects of American culture. 4 lectures. Prerequisite: SOC 201, PSY 201.

PE 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report required. Minimum of 120 hours total time.

PE 463 Senior Seminar (4)

Research design and procedures; issues, practices and trends in the professions; other material relevant to graduating seniors. 4 lecture-discussions. Prerequisite: senior standing or permission of instructor.

PE 469 History of Women in Sport Before 1930 (2)

Women's role in sport from ancient Egypt and Greece to 1930. Includes individual athletes and women's contributions to the growth and development of sport. 2 lectures.

PE 470 History of Women in Sport Since 1930 (2)

Women's role in sport from 1930 to present. Individual athletes and women's contributions to American and international sport. 2 lectures.

PE 471 Advanced Coaching Strategies in Baseball/Softball (3)

Team and individual strategies and coaching tactics. Analysis of advanced baseball/softball skills, effective coaching techniques, theoretical and practical application of officiating. 2 lectures, 2 hours activity. Prerequisite: PE 323 or permission of instructor.

PE 472 Advanced Coaching Strategies in Basketball (3)

Team and individual strategies and coaching tactics. Analysis of advanced basketball skills, effective coaching techniques, theoretical and practical application of officiating. 2 lectures, 2 hours activity. Prerequisite: PE 325 or permission of instructor.

PE 473 Advanced Coaching Strategies in Football (3)

Team and individual strategies and coaching tactics. Analysis of advanced football skills, effective coaching techniques, theoretical and practical application of officiating. 2 lectures, 2 hours activity. Prerequisite: PE 321 or permission of instructor.

PE 474 Advanced Coaching Strategies in Track/Field (3)

Team and individual strategies and coaching tactics. Analysis of advanced track and field skills, effective coaching techniques, theoretical and practical application of officiating. 2 lectures, 2 hours activity. Prerequisite: PE 333 or permission of instructor.

PE 498 Professional Organizations in Physical Education Seminar (1)

Analysis of professional organizations in the physical education field. Includes attendance at state or national level conferences. 1 hour seminar. May be repeated for 4 units.

PE 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

Graduate courses are listed in the graduate section of this catalog.

POLITICAL SCIENCE

Bruce F. Grube, *Chair*

Mohammed A. Al-Saadi
Charles E. Clay
John H. Esterline
George P. Hart
John L. Korey
Ronald M. Peterson
José M. Vadi
Bruce E. Wilson

The department serves all segments of the university community. It provides courses which aim to develop mature and informed citizens; it gives training for those who wish to pursue a career in public service; it offers a foundation for those who plan to continue into graduate study.

The political science major and all courses offered by the department are designed to integrate the latest behavioral science knowledge about government and politics with a broad understanding of public policy and the role of government in society in both the domestic and international areas. The major prepares students for careers in which knowledge of politics and public affairs is required. Such careers include teaching, administrative and management positions in all areas of government, political staff positions, and public affairs staff positions in business and industry.

The importance of government in our society and economy grows with urbanization and industrialization. The unique location of the university in a rapidly growing population offers opportunities for close observation of, and experience with, problems of government and politics. The curriculum combines theoretical and methodological procedures with practical concern for vocational preparation and participation in the political system.

A specialized curriculum offers an option in public administration.

Students majoring in political science and who have a GPA of at least 3.0 overall and 3.5 in their major have the opportunity to join Pi Sigma Alpha, the national honorary society in political science. Additional information can be obtained from the Department of Political Science.

CORE COURSES FOR MAJOR

(Required of all students)

*Comparative Political Systems	PLS	202	(4)
*Intro Political Thought	PLS	204	(4)
*Intro Research Methods	PLS	205	(4)

Students must complete one of the following:

Principles of Economics	EC	201	(4)
History of Civilization	HST	103	(4)
Logic and Semantics	PHL	202	(4)

*All majors must complete these courses by the end of their sophomore year, or by the end of their first year of residency, whichever comes later. Other courses listed in core may not be used for support and elective courses.

OPTION COURSES FOR MAJOR

(Required in specific options)

POLITICAL SCIENCE

3 Three-course elective subfields	(36)
2 One-course elective subfields	(8)
Additional courses in political science from any subfields	(8)

PUBLIC ADMINISTRATION

Public Administration	PLS	314	(4)
Public Policy Administration	PLS	315	(4)
Bureaucracy and Administrative Behavior	PLS	316	(4)
Government Budget Administration	PLS	414	(4)
Government Personnel Administration	PLS	415	(4)
Other Political Science Courses—Advisor Approval			(24)

SUPPORT AND ELECTIVE COURSES

(Required in specific options)

POLITICAL SCIENCE

Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
Advocacy and Argument	SP	204*	(4)
United States History	HST	201*	(4)
United States History	HST	202*	(4)
Intro to American Govt	PLS	201*	(4)
Courses to complete Gen.Ed. requirements (must include one lab science course and 12 units of upper division coursework 4 units of which may replace lower division coursework in Category II, III, or IV)			48
Free Electives			†(46)

PUBLIC ADMINISTRATION

Principles of Economics	EC	201*	(4)
Principles of Economics	EC	202	(4)
Freshman Composition	ENG	104*	(4)
Freshman Composition	ENG	105*	(4)
United States History	HST	201*	(4)
United States History	HST	202*	(4)
Intro to American Govt	PLS	201*	(4)
General Psychology	PSY	201*	(4)

*Select 4 courses from the following:****

Principles of Accounting	ACC	124	(4)
Intro to Managerial Accounting	ACC	125	(4)
Public Finance	EC	301	(4)
State & Local Government Finance	EC	430	(4)
Urban Economics	EC	432	(4)
Intro to Computing	CIS	110*	(4)
Management Principles and Theory	OM	307	(4)
Industrial & Personnel Psychology	PSY	332	(4)
Psychological Testing	PSY	416	(4)
Urban Sociology	SOC	401	(4)
Principles of Urban Planning	UP	301	(4)
Advocacy and Argument	SP	204	(4)
Courses to complete Gen.Ed. requirments (must include one lab science course and 12 units of upper division coursework 4 units of which may re-			

place lower division coursework in Category II, III, or IV)			(44)
Free Electives			†(34)

*Designated Gen. Ed. courses.

†The total curriculum must include 60 units of upper division courses.

POLITICAL SCIENCE MINOR

Required of all students:

Comparative Political Systems	PLS	202	(4)

The student must select 12 units from the following:

Race Relations and the Law	PLS	207	(4)
Public Administration	PLS	314	(4)
Public Policy Administration	PLS	315	(4)
Bureaucracy and Administrative Behavior	PLS	316	(4)
The Chicano in the American Political System	PLS	322	(4)
Political Parties	PLS	324	(4)
Interest Group Politics	PLS	325	(4)
American State and Local Politics	PLS	380	(4)
Minority Community Political Dynamics	PLS	383	(4)
Government Budget Administration	PLS	414	(4)
Government Personnel Administration	PLS	415	(4)
Legislative Process	PLS	421	(4)
Executive Process	PLS	422	(4)
Judicial Process	PLS	423	(4)
Foreign Relations of the United States	PLS	455	(4)
California Politics	PLS	480	(4)

The student must select 4 units from the following:

European Government and Politics	PLS	341	(4)
Politics of the Developing Nations	PLS	342	(4)
Comparative Public Administration	PLS	416	(4)
Chinese Government and Politics	PLS	443	(4)
Asian Governments and Politics	PLS	445	(4)
Soviet Government and Politics	PLS	447	(4)
International Relations	PLS	452	(4)
International Organization	PLS	453	(4)
Inter-American Relations	PLS	454	(4)
International Law	PLS	456	(4)

The student must select 4 units from the following:

Introduction to Political Thought	PLS	204	(4)
Introduction to Research Methods	PLS	205	(4)
Constitutional Law	PLS	401	(4)
Constitutional Law	PLS	402	(4)
Ancient and Medieval Political Thought	PLS	431	(4)
Modern Political Thought	PLS	432	(4)
American Political Thought	PLS	433	(4)
Marxism	PLS	435	(4)
20th-Century Political Thought	PLS	436	(4)
The student must select one 4-unit Political Science elective			(4)
Total units required for minor			(28)

PUBLIC ADMINISTRATION MINOR

Required of all students:

Public Administration	PLS	314	(4)
Bureaucracy and Administrative Behavior	PLS	316	(4)
Government Budget Administration	PLS	414	(4)
Government Personnel Administration	PLS	415	(4)

The student must select 16 units from the following:

Principles of Economics	EC	202	(4)
or General Psychology	PSY	201	
Principles of Accounting	ACC	124	(4)
Introduction to Managerial Accounting	ACC	125	(4)
Management Principles and Theory	OM	307	(4)
Introduction to Computing	CIS	110	(4)
Public Finance	EC	301	(4)
State and Local Government Finance	EC	430	(4)
Urban Economics	EC	432	(4)
Public Policy Administration	PLS	315	(4)
American State and Local Politics	PLS	380	(4)
Comparative Public Administration	PLS	416	(4)
International Organization	PLS	453	(4)
Field Work in Government and Politics	PLS	471	(1–4)
Field Work in Government and Politics	PLS	472	(1–4)
Industrial and Personnel Psychology	PSY	332	(4)
Psychological Testing	PSY	416	(4)
Total units required for minor			(32)

Course Descriptions

PLS 107 Pre-Law Workshop (4)

Introduction to law, legal education and legal bibliography for students considering a career in law or law enforcement. "Lectures" by returning law students, lawyers, judges, law enforcement officers, law school admissions deans, etc. 4 lecture-workshops.

PLS 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PLS 201 Introduction to American Government (4)

U. S. and California Constitutions and political philosophies of their framers; intergovernmental relations; political institutions and processes; rights and obligations of citizens. Meets state graduation requirement in U. S. Constitution and Government and U. S. Ideals and Institutions. 4 lecture-discussions.

PLS 202 Comparative Political Systems (4)

Introductory comparative analysis of both Western and non-Western politics and government. Relevance of such concepts as political culture, political socialization, and political ideologies to the understanding of political systems. 4 lecture-discussions.

PLS 204 Introduction to Political Thought (4)

Basic conceptions and principles of normative political theory. 4 lecture discussions.

PLS 205 Introduction to Research Methods (4)

Introduction to selected techniques employed in modern empirical political research. Research design; analysis of large-scale political data bases; application of statistical and data-processing techniques used frequently in the study of political behavior. 3 lectures, 1 two-hour activity. Prerequisites: PLS 201 or AMC 201; permission of instructor.

PLS 207 Race Relations and the Law (4)

Study of important U.S. Supreme Court cases concerning race relations. Political, social, and economic implications of judicially determined policy. 4 lecture-discussions.

PLS 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

PLS 314 Public Administration (4)

Structures, functions, principles, and processes of American governmental administration. Attention to importance and growth of government administration and to the principles and processes of establishing, directing, and evaluating governmental programs. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 315 Public Policy Administration (4)

Substantive policies of government in relation to economic, social, and political programs; the examination of public policy in relation to democratic institutions and the general problem of making public policy responsive to democratic control. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 316 Bureaucracy and Administrative Behavior (4)

Characteristics of bureaucracies with special attention to the functioning of bureaucracy as a social and political institution. Concepts of administrative behavior such as decision-making, leadership, and control. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 320 Political Change in Contemporary America (4)

Causes, consequences, and contours of political change in historical and contemporary America. Classical and modern theories of social and political change. Prospects of political change in America. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 322 The Chicano in the American Political System (4)

Socio-economic status, community organization and leadership; patterns of discrimination; farmworkers' movement; third-party efforts; political attitudes in Chicano communities; political representation, the administration of justice. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 324 Political Parties (4)

Nature and function of American political parties: party organization, political campaigns, and elections. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 325 Interest Group Politics (4)

The nature and function of organized interest groups and their impact on government activity and programs. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 341 European Governments and Politics (4)

Comparative analysis of the political institutions, governmental organizations, and social structures of some selected countries of Western Europe, with special reference to contemporary problems of post-industrialism. Regional economic and political organizations and their global impact. May be repeated once for credit. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 342 Politics of the Developing Nations (4)

Examination of the socio-economic and political problems of the developing and new nations in their quest for modernization and development. Relevance of Western and Soviet-Marxist models to the political experience of the new nations. May be repeated for credit in specialized area studies (Latin America, Middle East, Africa, Far East). 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 380 American State And Local Politics (4)

Comparative analysis of the structures and functions of state and local governments, and of the roles of, and relationships among the several levels of governments in American federalism. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 383 Minority Community Political Dynamics (4)

Problems of ethnic minorities from the perspective of the community organizer: the sources of powerlessness, impediments to effective community organizations, power structure studies, and the building of political coalitions to advance group interests. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

PLS 401 Constitutional Law (4)

Influence of U.S. Constitutional law on the structure, powers, and relationships of American government. Supreme Court interpretations of taxing, commerce, and war powers; federalism; separation of powers; checks and balances; intergovernmental relations. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 402 Constitutional Law (4)

Influence of U.S. Constitutional law on civil liberties, civil rights. Relation of Constitution to personal liberty; procedural rights; freedom of religion, speech, press, assembly; due process; equal protection. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 404 The Criminal Justice System (4)

The structure and operation of the criminal justice system. Roles of the institutions—police, attorneys, corrections—within that system. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 405 Jurisprudence (4)

The sources, nature, and growth of law; the roles of logic, experience, and normative principles in the legal decision. Historical, behavioral, analytical, philosophical, sociological, and realist schools of legal theory. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 414 Government Budget Administration (4)

Development of the concept of government budgeting. The role of the budget in determination of policy and in administrative control of governmental operations. Public revenues, expenditures, debt, and fund accounting. 4 lecture-discussions. Prerequisites: PLS 201 or AMC 201; PLS 314.

PLS 415 Government Personnel Administration (4)

History of American public personnel and civil service administration, including the role of the civil servant in society. Objectives, principles, and processes of administering the personnel function of government; recruiting, training, promotion, and control of government personnel. 4 lecture-discussions. Prerequisites: PLS 201 or AMC 201; PLS 314.

PLS 416 Comparative Public Administration (4)

Comparative study of the administrative processes in various institutional settings and in a number of political cultures. 4 lecture-discussions. Prerequisites: PLS 202, 314.

PLS 421 Legislative Process (4)

Legislatures as political subsystems; behavior, processes, functions of legislators and legisative bodies. Emphasis on U.S. Congress and its changing role within the American political system. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 422 Executive Process (4)

Executives as political subsystems: role and function of the executive in the development and implementation of public policies. The Presidency as institution and process in the American political system. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 423 Judicial Process (4)

Courts as political subsystems: jurisprudential considerations in a political context; judicial roles, actors, and behaviors. Comparative judicial systems. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 425 Political Behavior (4)

Political factors involved in human behavior, including voting, public opinion, socialization, consciousness, authority, belief systems, alienation, and motivation. 4 lecture-discussions. Prerequisites: PLS 201 or AMC 201.

PLS 431 Ancient and Medieval Political Thought (4)

Major contributions of Plato and Aristotle to Western political philosophy; survey of the Middle Ages; Machiavelli. Emphasis on the timeliness of classical political conceptions. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 432 Modern Political Thought (4)

From Hobbes to the 19th century. Analysis of the break with the classical tradition. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 433 American Political Thought (4)

Major ideas and thinkers who have influenced American political and social life. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 435 Marxism (4)

Discussion of the roots of Marxism; analysis of the theory. Examination of 19th- and 20th-century criticism. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 436 Twentieth-Century Political Thought (4)

Selected theories of the 20th century, with emphasis on existentialism, Christian humanism, contemporary socialism, revolutionary theory, and representative conceptions of individualism. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 443 Chinese Government and Politics (4)

The structure and operation of the contemporary Chinese political system with special reference to the policies, doctrines, and institutions of Chinese communism; political problems of contemporary China. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 444 Politics of Latin America (4)

Analysis of models of Latin American political systems, their development and culture, key actors, and formal and informal processes; focus on socio-economic change and political trends in Cuba, Brazil, Mexico, Chile, and Argentina. 4 lecture-discussions. Prerequisite: PLS 201 or AMS 201.

PLS 445 Asian Governments and Politics (4)

Comparative analysis of political forms and processes in selected Asian nation-states with emphasis on their interrelationships and national efforts to meet challenges of modernization, communication, and security. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 447 Soviet Government and Politics (4)

Systematic analysis of the Soviet political system and culture; emphasis on issues of contemporary Communist ideology and its relevance to the Soviet experience. Relevance of Soviet model to Third World nations. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 452 International Relations (4)

Contemporary international affairs, including analysis of politics among nations. Bases of national foreign policies, sovereignty, nationalism, and diplomacy. Technology, public opinion, and war in international relations. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 453 International Organization (4)

The nature, function and process of international organization, particuarly the League of Nations and the United Nations; regional organizations and specialized agencies. The United States' role in international organizations. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 454 Inter-American Relations (4)

Introduction to the problems and policies of the nations of Latin America with particular reference to their relations to the superpowers and their participation in international organizations. 4 lecture-discussions. Prerequisite: PLS 452 or permission of instructor.

PLS 455 Foreign Relations of the United States (4)

Survey of the United States foreign policy system with emphasis upon structural characteristics which influence decision-making. Examination of political, strategic and economic aspects of contemporary policy. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 456 International Law (4)

Nature, sources, function, and evolution of international law; principal law-making and adjudicatory agencies; diplomatic and consular intercourse; treaties and executive agreements; pacific settlement of disputes; war and neutrality; international law and its function in international relations. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 461, 462 Senior Project (2) (2)

Selection and completion of a thesis under faculty supervision. Thesis to be of substantial academic quality on a significant problem in the student's major area of interest within political science. Formal report required. Prerequisite: senior standing. Required minimum of 120 hours.

PLS 463 Undergraduate Seminar (2)

PLS concentration in successive quarters on the several sub-areas of the discipline. Seminars in two political science sub-areas required for completion of the major. May be repeated for credit. Prerequisite: upper division standing or permission of instructor.

PLS 471, 472 Field Work in Government and Politics (1–4) (1–4)

Placement in government agencies or political organizations for practical applications of academic training. Written report and evaluation required. 10 hours a week on agency assignment for each unit of credit. Total credit limited to 8 units. Prerequisite: permission of instructor.

PLS 480 California Politics (4)

The political system in California with reference to its institutions, leaders, and electoral process; the state's political development and voting behavior. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 490 Political Inquiry (4)

The philosophical grounds of inquiry, including an introduction to the philosophy of the social sciences. Seminar, 4 hours. Prerequisites: PLS 201 or AMC 201; PLS 205; permission of instructor.

PLS 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

PLS 550 Seminar in Political Science (1–4)

Topics in fields of political science offered according to interests and needs of students. Each seminar to have subtitle identifying the field. Seminar, 1–4 hours. Prerequisites: graduate standing, permission of instructor. May be repeated for maximum of 12 units.

RECREATION ADMINISTRATION

One of the two majors offered in the Department of Health, Physical Education, Recreation, and Dance is recreation administration. For the other program offered in the department, see physical education.

Stanley L. Bassin, *Chair*

Gus Gerson, *Coordinator*

Aubrey Fine Jack Frost Lance Beal

Barbara Ford

The recreation major offers a 4-year curriculum leading to the Bachelor of Science in Recreation Administration with specialization areas in (1) human and cooperative services, (2) outdoor, (3) therapeutic recreation and (4) commercial recreation. Study in these areas is intended to equip the student for professional-level entry into a variety of administrative positions within a broad range of leisure services: in government, education, industry, health services, churches, camps, and other organizations and agencies. Recreation graduates can normally choose among career opportunities as activity and program specialists, supervisors, planners, researchers, administrators, consultants, and others.

The core curriculum, emphasizing preparation for professional leadership in the management of leisure activities, combines theory with practice so as to provide both a body of knowledge and a set of personal skills. A minimum of required support courses allows the student considerable flexibility in designing, in consultation with faculty advisors, an individualized program of a multidisciplinary nature intended to strengthen the selected area of specialization.

The Recreation Administration minor will prepare students to work with people using recreational skills and techniques. This minor is appropriate for students majoring in Social Services, Social Sciences, Humanities, Liberal Studies, Physical Education, and others.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Recreation	REC	126	(4)
Intro to Outdoor Recreation	REC	127	(4)
History, Phil & Theory of Rec	REC	132	(4)
Recreation Skills Practicum	REC	140	(4)
Programming & Leadership	REC	221	(4)
Social Recreation	REC	223	(4)
Intro to Therapeutic Rec	REC	224	(4)
Organiz. & Mgmt I	REC	320	(4)
Organiz. & Mgmt II	REC	321	(4)
Comm Rel in Rec	Rec	340	(4)
Career Search in Recreation	REC	453	(3)

PLUS

Internship (or Coop Ed) full-time intern	REC	465	(16)

SPECIALIZATION AREAS

Additional courses in choice of one of four specialization areas ..... (14-16)

Outdoor Core Courses:

Org/Adm of Camping	REC	315	(4)
Outdoor Education	REC	318	(4)
Youth Organizations	REC	409	(3)
Trends/Prob Otdr Rec	REC	417	(4)

Human and Cooperative Services Core Courses:

Rec Games & Sports	REC	222	(4)
Rec Mgmt Urb Setngs	REC	306	(4)
Prob Hum & Coop Svc	REC	406	(4)
Fundraising Tech.	REC	440	(3)

Commercial Core Courses:

Comp Rec & Lsr Svcs	REC	240	(3)
Commer Rec Agcy Mgmt	REC	345	(4)
Fundraising Techn.	REC	440	(3)
Mgmt Prin & Theory	OM	307	(4)

Therapeutic Courses:

TR for Phys Handi & MR	REC	325	(4)
Leis. Tow. Retir.	REC	326	(4)
TR: Psych & Correc.	REC	415	(4)
Leis. Counseling	REC	416	(3)

SUPPORT COURSES

Outdoor:

Intramurals	PE	350	(3)
First Aid	PE	205	(4)
Creativity	ME	320	(3)
Campcrafter Skills	REC	218	(3)
Outdoor Survival	REC	418	(3)

Human & Cooperative Services:

Intramurals	PE	350	(3)

Select a Min. of 13 units:

Dev. Mvmt Chldrn	PE	328	(3)
Creativity	ME	320	(3)
Park Fac. Mgmt	PA	425	(4)
Public Admin.	PLS	314	(4)
Gov Budg Adm	PSL	414	(4)
Gov Personnel Adm	PLS	415	(4)

Commercial:

Intramurals	PE	350	(3)

Therapeutic Recreation:

Intramurals	PE	350	(3)
Human Anatomy	ZOO	234	(4)
Adaptive PE	PE	206	(3)
Abnormal Psych	PSY	415	(4)
Kinesiology	PE	302	(4)

DIRECTED ELECTIVES

SEE ADVISOR

GENERAL EDUCATION:

Category I—12 units

Required of all:
Freshman Comp
ENG 104
PHL 202
SP 100

Category II—16 units

Required of all:
STA 107 or 120
ESC 101
BIO 110, 111

Outdoor:
Select one:
BIO 201, 213, 220
ESC 111, 112, 115, 116, 117, 120, 250
GEO 101

Human & Cooperative Svcs:
CS 101 *or*
CIS 110

Commercial:
CS 101 *or*
CIS 110

Therapeutic:
ZOO 235

Category III—12 units

Required of all:
MU 100 or PE 202 - -
ENG 205, 215, 216, *or*
Foreign Language

Outdoor:
PHL 201 *or* 204

Human & Coop. Svcs:
PHL 201 *or* 204

Commercial:
PHL 205

Therapeutic:
PHL 201 *or* 204

Category IV—12 units

Outdoor:
SW 201 *or* EWS 145 or 201 or 202
PLS 202 or 204 *or* HST 201

Human & Coop. SVCS:
EC 201 or SSC 101
ENV 113

Commercial:
MHR 104 or MKT 201
PLS 202 or 204 or HST 201

Therapeutic:
EC 201 or SSC 101
PLS 202 or 204 or HST 201

Category V—4 units

Choose one of CPU 201, 202 or PSY 201 (all specializations)

Category VI—8 units

AMC 201 or PLS 201 & AMC 202 or HST 202 (all specializations)

Category VII—8 units (See advisor)

UNRESTRICTED ELECTIVES:

OUTDOOR (7)
HUMAN & COOP. SVCS (7)
COMMERCIAL (42)
THERAPEUTIC (7)

MINOR IN RECREATION ADMINISTRATION

May be taken by PE majors

Courses in Minor

Introduction to Recreation	REC	126	(4)
History, Theory, Philosophy	REC	132	(4)
Programming and Leadership	REC	221	(4)
Community Relations	REC	340	(3)
Leisure Counseling Services	REC	416	(3)
*PLUS a minimum of 16 units (with the approval of recreation minor advisor)** from following list (minimum one upper division course)*			(16)
Leisure in Society	REC	125	(4)
Introduction to Outdoor Recreation	REC	127	(4)
Recreational Skills Practicum	REC	140	(4)
Campcrafter Skills	REC	218	(4)
Recreational Games/Sports	REC	222	(3)
Social Recreation	REC	223	(4)
Intro to Therapeutic Recreation	REC	224	(4)
Recreational Dance	REC	225	(4)
Comparative Recreation & Leisure	REC	240	(3)
Urban Recreation	REC	306	(4)
Organization & Administration of Camping	REC	315	(4)
Outdoor Education	REC	316	(4)
Organiz. & Mgmt I	REC	320	(4)
Organiz. & Mgmt II	REC	321	(4)
Recreation for Handicapped & Retarded	REC	325	(4)
Problems in Community Recreation	REC	406	(4)
Psychiatric and Correctionals	REC	415	(4)
Trends & Problems in Outdoor Recreation	REC	417	(4)
Outdoor Survival	REC	418	(4)
Program in Field Work/Seminar	REC	423	(6)
Fund Raising Techniques	REC	440	(3)
Total units required			(35)

** These 16 units may *not* be selected at random. Must be grouped and sequenced to accomplish a specific minor objective, i.e., support a teaching major, work in employee/industrial recreation, complement a major in business, HRM, park administration, provide tools to be used in social services, adapted PE, elementary education, etc.

Course Descriptions

REC 125 Leisure in Society (4)

Exploration of current research identifying the socio-psychological basis of leisure. Affective factors influencing development of a leisure life style philosophy; leisure needs assessment; leisure time as a resource. 4 lectures.

REC 126 Introduction to Recreation (4)

Nature, scope, and significance of leisure and recreation in contemporary society. Agencies which provide recreation and leisure services; interrelationships of agencies; career opportunities. 4 lecture-discussions.

REC 127 Introduction to Outdoor Recreation (4)

Introduction to and participation in a variety of outdoor programs aimed at enhancing the student's knowledge and appreciation of the outdoors. 3 lectures, 2 hours activity.

REC 132 History, Philosophy, and Theory of Recreation (4)

Theoretical, historical and philosophical examination of the leisure and recreation movement. Play theories, philosophical principles of play and leisure. Influence of socio/psychological theories on the development of leisure and recreation philosophy. 4 lecture—discussions.

REC 140 Recreation Skills Practicum (4)

Survey and application of activity tools used by recreation professionals: crafts, art, games, hobbies, dance, music, adaptives, outdoor skills, drama, others. Mobilization of resources, skill level assessment testing. 2 lectures, 4 hours activity. Prerequisite: permission of instructor.

REC 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

REC 216 Orienteering (2)

Development of skills in the art of orienteering; use of map and compass to find one's way in the out-of-doors or in competitive situations. Provides an alternative mode for physical activity. 1 lecture, 2-hour activity.

REC 218 Campcrafter Skills (3)

Outdoor skills and camp program planning for youth leaders. Opportunity to qualify for campcrafter and advanced campcrafter certification through American Camping Association. Overnight camping trips. 2 lecture-discussions, 2 hours activity.

REC 221 Programming and Leadership in Recreation (4)

Introduction to programming and leadership in a simulated recreation agency. Experiential application of theory and techniques to needs assessment, goals, behavioral objectives, activity analysis, planning principles, performance measurement, program evaluation. Cost accounting, record keeping, staff-subordinate relations. 3 lectures, 2 hours activity.

REC 222 Recreational Games and Sports (3)

Application of theory and leadership techniques to games/sports in tot lots, playgrounds, schools, etc. Emphasis on identification of needs, interests, and abilities of age groups; practical community projects in programming, supervision, and evaluation. 3 lecture-discussions, 2 hours activity. Prerequisites; sophomore standing, permission of instructor.

REC 223 Social Recreation (4)

Application of theory and leadership techniques to social recreation programming for teens through senior citizens. Emphasis on development of the social self; communication and feedback techniques; interaction skills. Practical experience with small and large groups. 3 lectures, 2 hours activity. Prerequisite: sophomore standing.

REC 224 Introduction to Therapeutic Recreation (4)

Introduction to therapeutic recreation in contemporary society; the role and qualifications of the recreation therapist, types of settings for employment, philosophy and terminology; field trips, class projects, and practical experience in a therapeutic setting. 3 lectures, 2 hours activity. Prerequisites: REC 126, 132, 221; or permission of instructor.

REC 225 Dance in Recreation (4)

Organization and supervision of dance programs in recreation; includes simple rhythmics, folk, square, international, round, and social dances. Emphasis on development of an appreciation of dance, rather than a mastery of performance skills. 2 lectures, 4 hours activity. Prerequisites: sophomore standing, permission of instructor.

REC 240 Comparative Recreation and Leisure Services (3)

Examination of world leisure as a developing recreation industry. Comparison of world leisure patterns and the development of recreation attractions. 3 lectures.

REC 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

REC 306 Recreation Management in Urban Settings (4)

Urban ethnography and recreation; analysis of community settings, participant groups and recreation-related organizations and programs in urban areas; recreation, social class, and ethnic groups; recreation and city planning; special leadership, program and recruitment needs. 3 lectures, 2 hours activity. Prerequisites: REC 126, 132, 221 or permission of instructor.

REC 314 Recreation and Special Populations (4)

An overview of the nature and extent to which leisure service programs are offered to and available for special populations. Three one-hour lectures, one two-hour laboratory. No prerequisites are required.

REC 315 Organization and Administration of Camping (4)

Objectives and problems dealing with the organization and administration of resident camps, school camps, day camping. Exposure to practical camping situations. 3 lectures, 2 hours activity. Prerequisites: REC 127, 140, 221, BIO 201; or permission of instructor.

REC 316 Wilderness Leadership (3)

Techniques in the development of leadership for recreational activities particularly as applied to outdoor camping. Social development and integration of individuals into group programs. 2 lectures, 2 hours activity. Prerequisites: REC 127, upper division standing.

REC 318 Outdoor Education (4)

Human and natural resources for the outdoorsman's appreciation of the environment; man's relationship with nature as viewed in field trips and other practical experiences. 3 lectures, 2 hours activity. Prerequisites: junior standing, permission of instructor.

REC 320 Organization and Management I (4)

Concepts and theories of management and the organization of leisure delivery systems as the first of a two-part course. Part I explores recreation organizations, management theory, staffing and political components. 4 lecture/discussions. Prerequisites: REC 126, 132, 140, 221, 224, or permission of instructor.

REC 321 Organization and Management II (4)

Concepts and theories of management and organization of leisure delivery systems as the second part of a two-part course. Part II explores management procedures related to legal, financial, and evaluative functions. 4 lecture/discussions. Prerequisites: REC 320 or concurrent enrollment.

REC/SW 324 Handicapped Populations (4)

Development of sensitivity and understanding of special problems encountered by handicapped populations as related to economic, social and political perspectives. Emphasis on verbal and written documentation, employment and personnel practices, architectural barriers, legal aspects and impact on society. 4 lecture-discussions.

REC 325 Therapeutic Recreation for Handicapped and Retarded (4)

The role and skills of the recreation therapist in a facility for general medical or retarded clientele; hospital routines and staff functions; effective charting and reporting. Opportunity for volunteer field experience. 3 lectures, 2 hours activity. Prerequisite: REC 221, 224, permission of instructor.

REC 326 Leisure and Retirement (3)

Understanding and evaluating the leisure needs of the older adult. Myths and realities of aging as they relate to personal life styles and the older people in our lives. Preparation for retirement: fears, potentials, alternatives. 3 lecture/discussions.

REC 340 Community Relations in Recreation (3)

Concepts and effective techniques in person to person relationships as they relate to the selling of self and recreation agency to various publics. Demonstration of such skills as: brochure preparation, reports to commission, budget presentations, telephone calls, interviews, bond issues, etc. 3 lectures.

REC 345 Commercial Recreation Agency Management (4)

Management methods in commercial recreation agencies. Funding, site location, program, law, budgets, and marketing. Recreation agencies include destination resorts, private camps, equestrian centers, retail outlets. 3 lectures, 2 hours activity. Prerequisite: REC 240.

REC 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

REC 406 Problems in Human and Cooperative Services (4)

Advanced current topics in community recreation; school-community education, community resource management, recreation for adults and senior citizens, consumerism, community services, others; application of problem-solving methods, use of case studies. 4 lecture-discussions. Prerequisites: REC 306, 320, 321, or permission of instructor.

REC 409 Youth Organizations (3)

Comparative analysis of major youth organizations in America, their aims, objectives, and contributions to American society. 2 lectures, one-hour activity. Prerequisites: REC 126, 127 or permission of instructor.

REC 415 Therapeutic Recreation: Psychiatric and Correctional (4)

Therapeutic tools used in psychiatric and correctional settings; interdisciplinary roles and relationships; intensive individual and group processes in an experiential climate. The recreation therapist as a mental health professional. 3 lectures, 2 hours activity. Prerequisites: REC 224, 225; or permission of instructor.

REC 416 Leisure Counseling (3)

Development of counseling skills; use of assessment tools to assist people in determining their leisure time needs, potentials, and resources. Non-traditional leisure such as civic involvement, education, second careers, and others will be explored. 2 lectures, 1 two-hour activity.

REC 417 Trends and Problems in Outdoor Recreation (4)

Role of outdoor recreation in modern society; includes government and nongovernment functions and how they relate to current trends and problems. 3 lectures, 2 hours activity. Prerequisites: REC 127, 315; or permission of instructor.

REC 418 Outdoor Survival (3)

Development of fundamental outdoor survival skills; shelters and campsites, fire building, importance of water, orienteering and travel, animal and plant food. Development of a positive attitude toward maintaining life in stressful situations; practical application of skills in outdoor environment. 2 lecture-discussions, 2 hours activity.

REC 423 Program in Field Work/Seminar (6)

A pre-professional experience in supervised programming and leadership for public, private, therapeutic, and commercial recreation settings. Placement according to the student's background needs and interests. 1 lecture, 12 hours field work. Prerequisite: instructor permission.

REC 440 Successful Fund Raising Techniques (3)

Overview of fund raising skills and methods; emphasis on developing realistic objectives and workable action plans. Includes direct mail fund raising, starting an endowment, major gift solicitation, memorial giving, etc. 3 lectures.

REC 453 Career Search in Recreation (3)

Techniques of the job search in recreation. Development of students' professional file including: resume, cover letter, follow-up materials. Practice before an oral interview board, videotaping of interviews, and critique. 2 lectures, 1 two-hour activity. Prerequisites: senior standing and instructor permission.

REC 465 Internship (16)

Full-time internship experience in an approved recreation agency; 40 hours per week for a full quarter, by contract. Seminar and field work, 400 hours minimum. Admission by prior application.

REC 498 Professional Organizations Seminar (1)

Analysis of professional organizations in recreation. Attendance at, participation in, and evaluation of approved local, state, and national conferences. 1 hour seminar. May be repeated 4 times for credit.

REC 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

SOCIAL SCIENCES

One of the four majors offered in the social sciences department is social sciences. For other programs in the department see American studies, anthropology/geography, and philosophy.

Walter P. Coombs, *Chair*

Judith I. Anderson
Thomas C. Blackburn
Joan M. Greenway
Richard Hyslop
Richard L. Johnson
David G. Lord
Sheila G. Manes
James C. Manley
Forrest L. McElhoe
Crane S. Miller
John A. Moore Jr.
Yolanda T. Moses
Richard C. Richards
Floyd H. Ross
Emilio J. Stanley

The social sciences are concerned with all aspects of human society, from the origins of man to the latest election returns. In keeping with that tradition, the department offers a flexible program leading to a bachelor of science degree with opportunities for each student to concentrate in one or more areas of the social science disciplines (anthropology, economics, geography, history, political science, psychology, sociology, and social science).

The department curriculum, multidisciplinary in nature, is especially suitable for students with a broad interest in human problems who believe that a liberal education is the best background for many types of careers. One of the aims of the department is to develop the student's understanding, appreciation, insights, and flexibility in order to do well in a broad spectrum of employment possibilities—secondary teaching, government services, commerce, and industry—or to proceed into graduate studies.

The courses in American civilization are designed to help majors from all schools of the university understand the ideas and practices which have molded American character, shaped American government, including California state and local government, and influenced the role of the United States in world affairs.

The American Studies, Anthropology/Geography, and Philosophy programs for majors and minors are listed in detail separately.

Because of the interdisciplinary nature of the Social Sciences Department, minors which are offered may be taken by students majoring in the curricula offered by the department. Specific details on the conditions under which these minors may be taken and by which majors are available from the department office.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Physical Anthropology	ANT	101	(4)
Culture and Personality	ANT	355	(4)
or Social Anthropology	ANT	358	
Cultural Geography	GEO	102	(4)
Economic Geography	GEO	312	(4)
or U.S., Canada Geography	GEO	350	
History of Civilization	HST	101	(4)
History of Civilization	HST	102	(4)
Ethics	PHL	204	(4)
World Religions	PHL	210	(4)
or World Religions	PHL	211	
Introduction to Social Sciences	SSC	101	(4)
or Social Sciences Methodology	SSC	333	

Each student will complete at least 6 upper division courses in 2 or more of the social sciences (American studies, anthropology, economics, ethnic and women's studies, geography, history, political science, psychology, sociology, social science) .. (24)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Introduction to Cultural Anthropology	ANT	102	(4)
Principles of Economics	EC	202	(4)
Freshman Composition	ENG	104	(4)
Freshman Composition	ENG	105	(4)
Intro to Ethnic and Women's Studies	EWS	140	(4)
Physical Geography	GEO	101	(4)
History of Civilization	HST	103	(4)
Introduction to Philosophy	PHL	201	(3)
Lower Division Seminar	PHL	151	(1)
Logic and Semantics	PHL	202	(4)
Political Systems	PLS	202	(4)
General Psychology	PSY	201	(4)
Principles of Sociology	SOC	201	(4)
Public Speaking	SP	100	(4)
Courses to complete general education requirements			(28)
Free Electives			(50)

Course Descriptions

American Civilization

AMC 201 American Civilization (4)

Analysis of American institutions: emphasis on the constitutions and governments of California and the United States; rights, obligations and powers of citizens; key social, cultural, economic values and ideals which shape the unique American character. Meets state graduation requirement in U.S. Constitution and Government and U.S. Ideals and Institutions. 4 lecture discussions.

AMC 202 American Civilization (4)

Analysis of the American experience and institutions; their derivation from other cultures; significant historical events since the country's inception; role of major ethnic and social groups; relationships with external regions and powers; the development of the American Character; ideals and values of American civilization. Meets state graduation requirements in U.S. History and American Ideals. 4 lecture-discussions.

Social Sciences

SSC 101 Introduction to Social Sciences (4)

An analysis of each of the many disciplines comprising the social sciences with particular emphasis on their interrelationships. A study of source materials and library techniqus as well as methods employed by social scientists. 4 lecture-discussions.

SSC 200 Special Prolems for Lower Division Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

SSC 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

SSC 301 Asian-American Experience in the United States (4)

The experience of the Asian-American in the United States; Chinese-Americans and Japanese-Americans on the West Coast from 1849 to the present. Effects of the media on the Asian-American community and foreign politics, cultural traditions, race relations. 4 lecture-discussions.

SSC 333 Social Sciences Methodology (4)

A survey of contemporary social science methods and techniques, including library research, field work, interviewing, questionnaires, models, quantification and computer analysis, cartography, remote sensing, and experimentation. 3 lecture-discussions, 2 hours activity.

SSC 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

SSC 401 Contemporary American Scene (4)

Domestic problems and issues confronting the American people today. Alternative proposals pointing toward solutions of these problems. 4 lecture-discussions.

SSC 410 The Study of Peace (4)

Interdisciplinary analysis of peace; inter-group conflict and conflict resolution; study of peace institutions such as the United Nations. Uses concepts and methodologies of several social sciences. 4 lecture-discussions.

SSC 441 Internship in Social Science (1–4)

Field training which relates academic and practical experience in the student's area of interest. Partial evaluation from work supervisor required upon completion. May be repeated for a maximum of 8 units. Prerequisite: department approval of student's application.

SSC 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report required. Minimum of 120 hours total time.

SSC 463 Undergraduate Seminar (2)

Intensive study of selected social problems with application of various techniques for analysis. 2 meetings. Prerequisite: completion of senior project.

SSC 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

SSC 550 Seminar in the Social Sciences (1–4)

Special problems in selected areas of the social sciences. Each seminar will have a sub-title describing its nature and content. Seminar, 1 to 4 hours. May be repeated for a maximum of 9 units.

SOCIAL WORK

Consuelo G. Lopez, *Acting Chair*

Victor E. Coppin Signe Starnes Jane M. Totman

The department offers courses leading to the bachelor of arts degree in social work. The program offered in the major is accredited by the Council on Social Work Education as appropriate preparation for beginning professional social work practice.

The primary career-related goal is the preparation of students for employment in such agencies as public welfare, probation and parole, youth and family service centers, and hospital settings, which offer direct services and require a bachelor's degree as the minimum requirement. The program, therefore, provides education of sufficient scope and depth to enable graduates to function effectively as first-line social workers who deal directly with client groups. A second career-related goal is the provision of the foundation for and the impetus toward graduate social work education.

For all students in the program, majors who will move into social work careers or who enter other careers, and non-majors taking social work courses, the program is designed to develop an understanding of the historical development of social welfare institutions, an awareness of contemporary social issues and a sensitivity to human feelings, all within the context of a set of professional values emphasizing human dignity and social change. An interdisciplinary approach is basic to the development of the educational objectives of the program.

In recognition of the central importance of experiential education in training for professional social work practice, the major includes a two-quarter sequence of required field instruction to be taken during the winter and spring quarters of the senior year. *Admission to this sequence, SW 412 and 413, Social Work Practice, is by written application and interview only.* Application forms are available in the department office and must be filed there by May 1.

CORE COURSES IN MAJOR

(Required of all students)

Introduction to Social Welfare	SW	201	(4)
The Life Cycle	SW	220	(4)
The Life Cycle	SW	221	(4)
Social Service Methods: Casework	SW	300	(4)
Social Service Methods: Group Work	SW	301	(4)
Social Service Methods: Community Organization	SW	302	(4)
Human Services in Health Settings	SW	303	(4)
Introduction to Field Work	SW	411	(4)
Social Welfare Practice	SW	412	(6)
Social Welfare Practice	SW	413	(6)
Social Welfare Policy & Issues	SW	431	(4)
Seminar in Social Welfare Research	SW	461	(2)
Seminar in Social Welfare Research	SW	462	(2)
Seminar in Social Welfare Research	SW	463	(2)

Ethnic Content Core (Select 1)

Soc. Cult. Diff. Child	SW	314	(4)
Intro. to Ethnic Studies	EWS	140	(4)
Afro-American Experience	EWS	201	(4)
Chicano/Hispanic Experience	EWS	202	(4)
American Indian Experience	EWS	203	(4)
Asian Pacific Experience	EWS	204	(4)

Social Work Core (Select 2)

Child Welfare Problems & Serv.	SW	310	(4)
Holistic Health	SW	311	(4)
Developmentally Disabled Child	SW	312	(4)
Child Youth & Family Crisis	SW	313	(4)
Soc. Cult. Diff. Child	SW	314	(4)
Cont. Treatment of Law Violators	SW	318	(4)
Probation and Parole	SW	320	(4)
Death and Dying	SW	470	(4)

SUPPORT COURSES

(Required of all students)

Intro. to Cultural Anthropology	ANT	102	(4)
Principles of Economics	EC	202	(4)
General Psychology	PSY	201	(4)
Principles of Sociology	SOC	201	(4)

Select 2 Courses From List Below:

Economics of Social Welfare	EC	437	(4)
Public Administration	PLS	314	(4)
Interest Group Politics	PLS	325	(4)
Child Psychology: Early Childhood	PSY	310	(4)
Child Psychology: Middle Years	PSY	311	(4)
The Psychology of Identity	PSY	321	(4)
Industrial & Personnel Psychology	PSY	332	(4)
Social Psychology	PSY	401	(4)
Abnormal Psychology	PSY	415	(4)
Recreation & Special Populations	REC	314	(4)
Therapeutic Rec. for Hand. Retarded	REC	325	(4)
Principles of Sociology	SOC	202	(4)
Social Organization	SOC	310	(4)
Urban Sociology	SOC	401	(4)
General Education courses *			(72)
Free Electives			(24)

* To be selected in consultation with advisor.

Course Descriptions

SW 110–114 Para-Professional Training (3)

Para-professional training in social services. Emphasis on substance abuse, program development, supportive counseling, and individual skill development. Each course 3 units. Prerequisite: enrollment in approved para-professional program or permission of instructor.

SW 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

SW 201 Introduction to Social Welfare (4)

A survey of the historical development of social welfare. Emphasis on a survey of social welfare philosophies and trends. 4 lectures.

SW 220 The Life Cycle (4)

Physical, psychological, social, and cultural factors of growth and development; emphasis on their implications for social work practice. Infancy, childhood, adolescence; normal and pathological development and behavior. 4 lecture-discussions.

SW 221 The Life Cycle (4)

Psycho-social development from young adulthood to old age. Related adaptive behavior. Application to social work practice. Growth and development, emphasizing ego psychology, social role disengagement, and activity theories related to individual development throughout adult years. 4 lecture-discussions. Prerequisite: SW 220 or PSY 201.

SW 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

SW 300 Social Service Methods: Casework (4)

Analysis of human behavior theories as related to the practice of social casework. Application of the casework method in simulated practice activity. 4 lectures. Prerequisite: SW 201.

SW 301 Social Service Methods: Group Work (4)

Survey and evaluation of the theory and application of group work methods employed by social workers. 4 lectures. Prerequisites: SW 300 or permission of instructor.

SW 302 Social Service Methods: Community Organization (4)

Survey and evaluation of community organization methods and techniques employed by social workers; relevant human behavior theory. Evaluation through classroom activity and actual activities in the field. 4 lectures. Prerequisites: SW 301 or permission of instructor.

SW 303 Human Services in Health Settings (4)

Varieties of specialized health care services for children and adults. Dealing with psychosocial, cultural, religious and government influences in the delivery of health care services. 4 lecture-discussions.

SW 310 Child Welfare Problems and Services (4)

Services for dependent, delinquent, neglected, physically-handicapped, and mentally-handicapped children. Hospital, institutional, and foster-home care. 4 lecture-discussions.

SW 311 Holistic Health (4)

Evolving holistic health concepts, attitudes and techniques. Historical derivations of the lack of interaction between traditional health and holistic health concepts and attitudes. 4 lecture-discussions.

SW 312 The Developmentally Disabled Child (4)

Investigation of physical and psychological developmental disabilities which impede personality growth and social adjustment of affected children. Treatment services and treatment techniques; family and community attitudes. 4 lecture-discussions. Prerequisite: permission of instructor.

SW 313 Child, Youth and Family Crisis (4)

The family as a social system. Dysfunction which emanates from the interaction of parent/child, sibling/sibling, and the marital pair. Ways of dealing with dysfunctional family roles and distorted communication. 4 lecture-discussions. Prerequisites: SW 220, or 221 or 301, or permission of instructor.

SW 314 The Socially and Culturally Different Child (4)

Bio-social-psychological dynamics of children from different social and cultural experiences. 4 lecture-discussions. Prerequisite: permission of instructor.

SW 318 Contemporary Treatment of Law Violators (4)

History of the treatment of offenders; emphasis on correctional institutions including visits to prisons. 4 lecture-discussions.

SW 320 Probation and Parole (4)

The theoretical and philosophical basis of probation and parole. Historical background; development and practice of investigation; supervision and treatment role of probation and parole officers. Past and present treatment models related to officer, offender, and community. 4 lecture-discussions. Prerequisite: permission of instructor.

SW/REC 324 Handicapped Populations (4)

Development of sensitivity and understanding of special problems encountered by handicapped populations as related to economic, social and political perspectives. Emphasis on verbal and written documentation, employment and personnel practices, architectural barriers, legal aspects and impact on society. 4 lecture-discussions.

SW 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

SW 411 Introduction to Field Work (4)

Preparation for entry into field work; its nature and purpose. Discussion of social welfare agencies and the workers as a member of the social work profession. 4 lecture-discussions. Prerequisite: SW 300. Admission by prior application (due May 1 each year).

SW 412 Social Welfare Practice (6)

Focus on "the client." Applying concepts for understanding human behavior; learning interviewing techniques. 16 hours activities each week in a social agency plus 2 hours seminar. Prerequisites: SW 411, permission of instructor.

SW 413 Social Welfare Practice (6)

Focus on the student as social worker. Assessment of client behavior and the role of the worker and his/her need for self-awareness. 16 hours activities each week in a social agency plus 2 hours seminar. Prerequisites: SW 412, permission of instructor.

SW 431 Social Welfare Policy and Issues (4)

Evaluation of current policy proposals, issues, and priorities concerning alterations in economic and social values and systems, particularly as these developments relate to social welfare policy development and decision-making. 4 lecture-discussions.

SW 461, 462, 463 Seminar in Social Welfare Research (2) (2) (2)

Explanation of research methods and studies in a particular social service field including corrections, health, family and children, and drugs and alcoholism. Completion of selected research projects, review of the literature, proposal writing and study design. Must be taken concurrently with SW 411, 412, 413.

SW 470 Death and Dying (4)

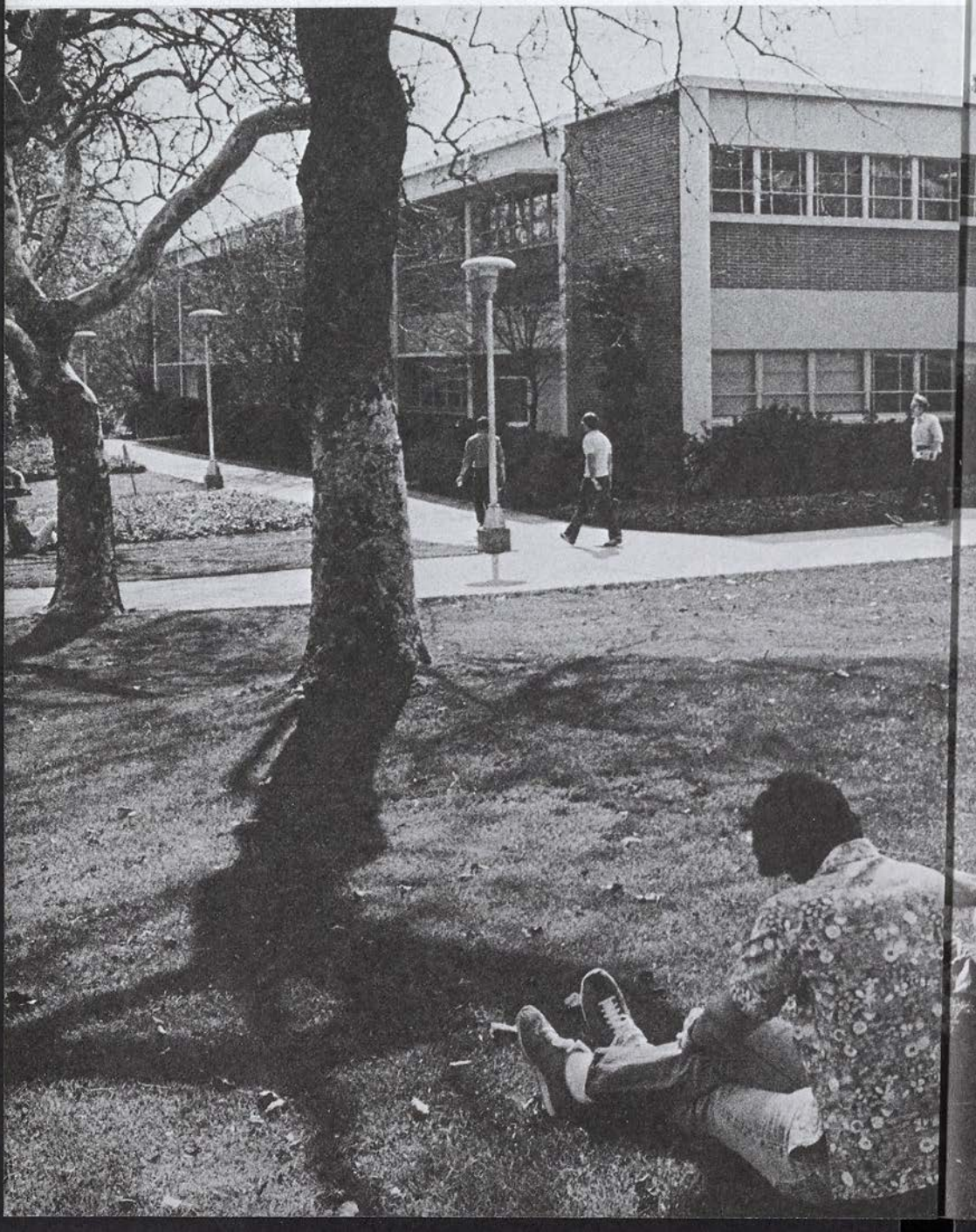
Death and dying in American society. Attitudes towards dying expressed in contemporary institutional policies and practices; cultural variations; selected case histories. Social work practice with the dying and their families. 4 lecture-discussions.

SW 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

SW 550 Special Topics in Social Work (1-4)

Review of selected topics in the social services, chosen according to needs and interests of students. Seminar, 1 to 4 hours. May be repeated for a maximum of 8 units. Prerequisite: permission of instructor.



SCHOOL OF BUSINESS ADMINISTRATION

SCHOOL OF BUSINESS ADMINISTRATION

W. Slater Hollis, *Dean*

Katherine B. Seibert, *Associate Dean*

Dolores A. Barsellotti, *Director, Planning, Programs and Systems*

The School of Business Administration provides six curricula leading to the Bachelor of Science degree in Business Administration and a curriculum which leads to the Bachelor of Science degree in Hotel and Restaurant Management. It also provides curricula leading to the master of business administration or the master of science in business administration. The master of science degree offers two options: business education and EDP auditing. Information concerning the masters curricula may be found in the graduate listings.

The undergraduate programs of study aim to give the student an understanding of the social and economic environment in which we live and to provide a common body of knowledge for all students who major in any business field. In addition, each major emphasizes, with additional course-work, specific areas of knowledge useful for the occupational fields served by that major. All students are encouraged to experiment and broaden their interests by selection of free electives. It is the purpose of the School of Business Administration to develop in our students the people, technical, and managerial competence necessary for successful performance in business, industry, government, education, whatever form of vocation chosen, and life in general. Special emphasis is given to the role of the handicapped as effective producers in our economy, to develop an awareness among our students as potential future employers.

The student selects a major upon entering and immediately assumes primary responsibility for meeting the educational requirements of the program. Through early studies in the courses common to all majors (the core), the student has an opportunity to evaluate a career decision and to adjust goals, if necessary. Undergraduate courses in business fundamentals and skills equip the student with saleable entry skills. The student may augment on-campus education through job experiences in business workstudy, cooperative education, and internship programs for which he will receive academic credit. General education courses are integrated throughout each major program. Co-curricular opportunities related to the course of study include the Accounting Club; the Chicano Business Students; the Management Information Systems Students Association, student chapter of Data Processing Management Association; Delta Sigma Pi, a professional business fraternity; Phi Chi Theta, Business Women's Association; Pi Sigma Epsilon, a professional sales and marketing fraternity; Rho Epsilon, a professional real estate fraternity; the Administrative Management Society; the Society of Hospitality Managers; and Delta Mu Delta, a business honorary society.

INDUSTRIAL RESEARCH INSTITUTE FOR PACIFIC NATIONS (I.R.I.PAC)

The Industrial Research Institute for Pacific Nations is a non-profit organization engaged in industrial and trade development research with a focus on Pacific Rim nations. The Institute is administered as the international research division of the School of Business Administration. Designed to support the advanced study of international business and to provide specialized educational opportunities for management personnel involved in the Pacific marketplace, the program offers the generation and coordination of research projects for university faculty and students, management and economic development seminars directed at better understanding of those doing business in the Pacific Rim, establishment of a reference and resource center, and publication of research papers.

DEPARTMENTS AND MAJORS/OPTIONS

MASTER OF BUSINESS ADMINISTRATION
With special option in career management

MASTER OF SCIENCE IN BUSINESS ADMINISTRATION
With options in Business Education and EDP Auditing
Madeline A. Currie, *Graduate Director*

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION with major offered by the following departments:

ACCOUNTING
Morcos F. Massoud, *Chair*

COMPUTER INFORMATION SYSTEMS
Donald B. Medley, *Chair*
Minor in Business Computer Programming

FINANCE, REAL ESTATE, & BUSINESS LAW
Hyung K. Jin, *Acting Chair*
Minor in Business Law

MANAGEMENT & HUMAN RESOURCES
Gene L. Houser, *Chair*
Minors in Administrative Management, Human Resources Management, and Small Business Management

MARKETING MANAGEMENT
James R. Hill, *Chair*
Minor in Marketing Management

OPERATIONS MANAGEMENT
Richard Sabo, *Acting Chair*

BACHELOR OF SCIENCE DEGREE IN HOTEL AND RESTAURANT MANAGEMENT
HOTEL, RESTAURANT, & TRAVEL MANAGEMENT
Angelo Bentivegna, *Chair*

CONTINUING EDUCATION IN BUSINESS

Many individual courses offered in the School of Business Administration provide practical learning opportunities to persons now employed in various career fields. By selecting courses that apply directly to a specific career, a person can enhance his or her professional capabilities, even though he or she may not be seeking a degree. Often, experience on-the-job is an adequate substitute for prerequisite courses so the student can enter upper division courses without completing preliminary courses. Courses that include in the description the prerequisite: " . . . or with the consent or permission of the instructor" normally fall in this category. Many such courses are available in the evening. Information about the Open University and Continuing Education courses in business can be supplemented by contacting the office of the dean of continuing education at Kellogg West on campus. The School of Business also provides credit or non-credit programs for business organizations on-site. Further information can be had by contacting the dean of the School of Business Administration.

To be eligible to take undergraduate courses in the School of Business Administration for degree credit, a person must be formally admitted to the University. Admission requirements are to be found in the front section of this catalog. Graduate courses and entrance requirements are listed in the graduate section of this catalog.

SCHOOL OF BUSINESS ADMINISTRATION COMMON CORE COURSES

Each student who enrolls for a Bachelor of Science Degree in Business Administration is required to select one of the six majors listed above. Irrespective of which major he selects, each student will be required to take the following courses which are common to all courses of study:

Financial Accounting	ACC	124	(4)
Financial Accounting	ACC	125	(4)
Intro to Computer Sys	CIS	110	(4)
Soc, Legal, Pol. Env	FRL	201	(4)
Org Theory & Behavior	BUS	301	(4)
Prin of Marketing	MKT	301	(4)
Managerial Statistics	OM	314	(4)
Prod & Oper Management	OM	331	(4)
Mgmt Policy & Systems	BUS	410	(4)
or	BUS	411	

SCHOOL-WIDE COURSES

COURSE DESCRIPTIONS

Bus 301 Principles of Organizational Theory and Behavior (4)

Introduction to the basic principles of organization theory and behavior and the influence of these concepts upon managing. 4 meetings: lectures, cases, and discussion.

Bus 410 Management Policies and Systems (4)

Seminar in the application and development of policy matters for general management. A capstone experience utilizing case problem anaylsis which involve the integration of business functions and the employment of business analytic techniques. Special examination of organizational problems with the handicapped. Seminar 4 hours. Prerequisite: Completion of School of Business Administration core requirements or consent of instructor.

Bus 411 Management Policies and Systems (4)

Seminar in the application and development of policy matters for general management. A capstone experience utilizing a computer simulation as a vehicle for integration of business functions and the employment of business analytic techniques. Special examination of organizational problems with the handicapped. Seminar 4 hours. Prerequisite: Completion of School of Business Administration core requirements or consent of instructor.

Bus 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects are designed to be individual or group efforts toward solving real-life problems in the community, such as S.B.I cases. Formal report is required. Prerequisite: Senior standing. Required minimum of 120 hours.

Bus 470, 471, 472, 473 Cooperative Education (2-4) (2-4) (2-4) (2-4)

On-the-job experience for all majors in the School of Business Administration. Students generally alternate one or more quarters of full-time studies in their major with an equal number of quarters of relevant full-time work for pay. Prerequisites: Consent of instructor and junior standing. (Courses must be taken in ascending sequence).

BUSINESS MINORS FOR NON-BUSINESS STUDENTS

Many non-business students have expressed an interest in business courses that will better prepare them to enhance their non-business education in a business or government environment. The School of Business Administration has designed, in addition to the minors available within certain majors, a broad-based schoolwide minor

to meet these needs. Non-business students desiring more information should contact the Dean's Office, School of Business Administration.

Other specialized business minors are offered by some departments within the School of Business Administration. Refer to individual department listings on the following pages for more information about specialized business minors.

BUSINESS MINOR

The student must complete the following required courses to fulfill the requirements for a minor in business:

Financial Accounting	ACC	124	(4)
Financial Accounting	ACC	125	(4)
Business Finance	FRL	301	(4)
Introduction to Organizational Behavior	MHR	318	(4)
Introduction to Computing	CIS	110	(4)
Principles of Marketing	MKT	301	(4)
Management Principles & Theory	OM	307	(4)

The student must select 8 units from the following list of electives:

Principles of Economics	EC	201	(4)
Principles of Economics	EC	202	(4)
Investment Analysis	FRL	330	(4)
Human Resources Management	MHR	311	(4)
Communications for Management	MHR	324	(4)
Introduction to Leisure Industry	HRT	101	(4)
Travel Management	HRT	201	(4)
Survey of Cobol	CIS	204	(4)
Programming Practice	CIS	214	(4)
Systems Approach to Problem Solving	CIS	225	(4)
Marketing Management for Non-profit	MKT	206	(4)
Marketing Communications	MKT	208	(4)
Transportation Systems and Traffic	MKT	303	(4)
Marketing for Small Business	MKT	304	(4)
Social, Legal, Political Environment	FRL	201	(4)
First-Line Management	OM	313	(4)

ACCOUNTING

Morcos F. Massoud, *Chair*

John K. Cheever
Keith B. Ehrenreich
Frank Ewing-Chow
Gail J. Fults
Vinay K. Gupta
Antoine G. Jabbour
Rochelle A. Kellner
Donald F. Putnam
Jewel M. Riddle
Alan R. Senn
Robert E. Willard

The accounting department provides an education for students who wish to enter the field of business with a thorough knowledge of the essential principles of accounting and a strong background for students desiring professional employment in public, private, or government accounting. The students majoring in accounting may select courses which will prepare them specifically for one of these fields.

The accounting courses are taught in the framework of modern business complexity so that the student becomes aware of the many factors in the decision-making process and of the contribution of the accountant's skills to administrative services.

COURSES IN MAJOR

CORE

Financial Acctg	ACC	124	(4)
Financial Acctg	ACC	125	(4)
Intro Comp Systms	CIS	110	(4)
Leg Env Bus-Trans	FRL	201	(4)
Prin of Mgmt	BUS	301	(4)
Marketing Prin	MKT	301	(4)
Managerial Statistics	OM	314	(4)
Prod & Operat Mgt	OM	331	(4)
Mgmt Pol & Systems	BUS	410	(4)
or Mgmt Pol & Systems	BUS	411	

MAJOR

Cost Accounting	ACC	211	(4)
Survey Cobol	CIS	204	(4)
Intermed Acctg	ACC	301	(4)
Intermed Acctg	ACC	302	(4)
Intermed Acctg	ACC	303	(4)
Federal Tax I	ACC	331	(4)
Legal Env of Bus-Org.	FRL	302	(4)
Intro Fin Mgmt	FRL	304	(4)
Intro Fin Mgmt	FRL	305	(4)
Audit Principles	ACC	419	(4)
Acctg Theory & Research	ACC	465	(4)
Specialty Options (see department for list of Specialty Options and electives)			(16)

GENERAL EDUCATION AND SUPPORT COURSES

Advocacy and Argument	SP	204	(4)
Amer Civilization	AMC	201	
or Intro Amer Govt	PLS	201	(4)
Amer Civilization	AMC	202	
or U.S. History	HST	202	(4)
Elementary Statistics	STA	120	(4)
Ethics	PHL	204	(4)
Freshman Comp	ENG	104	(4)
Freshman Comp	ENG	105	(4)
General Psychology	PSY	201	(4)
Intro Calculus for Business	MAT	125	(4)
Principles of Economics	EC	201	(4)
Additional Units of General Education (including 4 units upper-division; See Advisor)			(32)
Principles of Economics	EC	202	(4)
Electives (Other than Business, Economics, *or* Public Administration)			(8)
Free Electives			(18)

Course Descriptions

ACC 124, 125 Financial Accounting (4) (4)

Fundamentals of analyzing, measuring, recording and communicating financial transactions/events. Accounting equation and cycle. Relationships among assets, liabilities, owners' equity, revenues, expenses, gains and losses. Balance sheet, income statement, and statement of changes in financial position. ACC 124 is a prerequisite to ACC 125. 4 lectures.

ACC 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation research, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ACC 211 Cost Accounting (4)

Cost accounting cycle; cost elements of a product; job order, process and standard cost systems; overhead allocation considerations; cost behavior, cost-volume profit relationships; analysis of overhead variances. 4 lectures. Prerequisite: ACC 125.

ACC 232 Income Taxes (4)

Federal income tax structure as related to individuals, including problems intended to provide an understanding of the principles. 4 lectures. (Not open to accounting majors.)

ACC 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ACC 301, 302, 303 Intermediate Accounting (4) (4) (4)

Analytical study and application of accounting theories and techniques including current literature of authoritative accounting organizations. 4 lectures. Prerequisite: ACC 211 and consent of the instructor. Minimum grade of "C" required in ACC 301 to advance to ACC 302 and a minimum grade of "C" is also required in ACC 302 to advance to ACC 303. ACC 301, ACC 302 and ACC 303 must be taken in sequence.

ACC 305 Accounting Information Systems (4)

Role, design, implementation, and management of the accounting information system as a subset of the management information system. Interface between accountants and computer specialists. 4 lecture-discussion. Prerequisites: ACC 125 (ACC 302 for Accounting majors) and CIS 204 or 224.

ACC 310 Managerial Accounting (4)

Control and decision-making, budgets, cost analysis and typical situations/problems. Not open to accounting majors. 4 lectures. Prerequisites: ACC 125, BUS 301, MKT 301.

ACC 331 Federal Tax I (4)

Income, expense, exclusion, deductions and credits for individual tax returns. 4 lectures. Prerequisite: ACC 305 or ACC 301.

ACC 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ACC 401 Advanced Accounting (4)

Miscellaneous topics in financial accounting including pensions, leases, interim and segment reporting, discontinued operations, inflation accounting, and partnerships. Prerequisites: ACC 303.

ACC 402 Advanced Accounting (4)

Governmental and institutional accounting and accounting for fiduciaries. 4 lectures. Prerequisite: ACC 302 or consent of instructor.

ACC 403 Consolidation and Foreign Currency Accounting (4)

Analytical study and application of principles of consolidation and foreign currency translation. 4 lectures. Prerequisite: ACC 302 or Consent of Instructor.

ACC 412 Managerial Accounting and Budgeting (4)

Budgeting and budgetary control including control and performance evaluation of enterprise activities. The use of accounting information in making management decisions. Analyze alternative decision problems using problems and/or cases. Prerequisites: ACC 211.

ACC 413 Case Studies in Controllership (4)

Analysis of accounting problems and business situations from the broad viewpoint of the controller. Studies of actual and simulated business cases. 4 lecture-discussions. Prerequisite: Senior standing.

ACC 415 Advanced Costing Techniques (4)

Utilization of quantitative techniques introduced in other classes and their relationships to accounting and managerial accounting. Discussion and review of related current literature; discussion and review of CPA and CMA exam questions. 4 lectures. Prerequisite: ACC 412 and OM 314.

ACC 419 Auditing Principles, Practices, and Procedures (4)

Theory of auditing and its objectives; procedures and techniques to attain objectives; types of reports issued by auditors; professional responsibilities and ethics of auditors. 4 lectures. Prerequisites: ACC 303 (Substitute ACC 305 for nonaccounting majors), and senior standing.

ACC 420 Advanced Auditing (4)

Extensive procedures and techniques in carrying out audit objectives; working paper development and preparation; preparation of opinion and report rendered by auditors; application of EDP to auditing. Current literature. 4 lectures. Prerequisite: ACC 419.

ACC 424 Internal Operational Auditing, and Systems (4)

Objectives, principles and methods of internal and operational auditing with special emphasis on examination and appraisal of internal controls in the various reporting systems. Problems of communication, delegation of authority, or organization. 4 lecture-discussions. Prerequisite: ACC 302 or 305.

ACC 432 Federal Tax II (4)

Federal taxes on partnerships, corporations, estates, trusts, reorganizations and tax planning. 4 lectures. Prerequisite: ACC 331.

ACC 441, 442 Internship in Accounting (1–8) (1–8)

On-the-job training in accounting involving new university-level learning experiences. Experiences may be useful as a basis for senior projects. Prerequisite: Permission of the Coordinator of Accounting Internships.

ACC 443 Internship in Auditing CPA (4)

On-the-job training with a CPA firm in phases of auditing. The experience must be new to the student. Analytical reports of work accomplished by each student are made periodically to the faculty coordinator. Units of college credit granted are dependent on departmental approval. Prerequisite: ACC 419, and permission of the Coordinator of Accounting Internships.

ACC 461 Senior Project (2)

Familiarization with probable sources of data and information for research oriented projects. Problem identification and analysis. Research methodology. Application of report writing tools and techniques. Prerequisites: ACC 302 and ENG 301.

ACC 462 Senior Project (2)

Selection and completion in formal report form of one or more project(s) under faculty supervision. Project(s) are research oriented and typical of problems which graduates may be required to solve in future occupations. Project(s) must involve library research and/or field study. Prerequisite: ACC 461.

ACC 465 Accounting Theory and Research (4)

Study of the general frame of reference for the evaluation and development of sound accounting practices. Emphasis on the normative rather than the descriptive approach—not a review of accounting professional pronouncements. Enhances analytical, research, judgmental, and communication skills of students. Prerequisite: ACC 419 and Senior Standing.

ACC 466 Fundamentals of Income Tax Preparation (4)

Federal and state income tax laws as related to individuals; tax return preparation, under faculty supervision, for the elderly and low-income taxpayers. 2-hour laboratory-activity. Prerequisites: ACC 331 or ACC 232 or concurrent enrollment.

ACC 476 C.P.A. Auditing Review (2)

Standards and objectives; reports; internal control; examination of internal and external records; working papers; procedures; and other related topics. 2 lectures. Prerequisite: ACC 419 or consent of the instructor.

ACC 477 C.P.A. Theory Review (2)

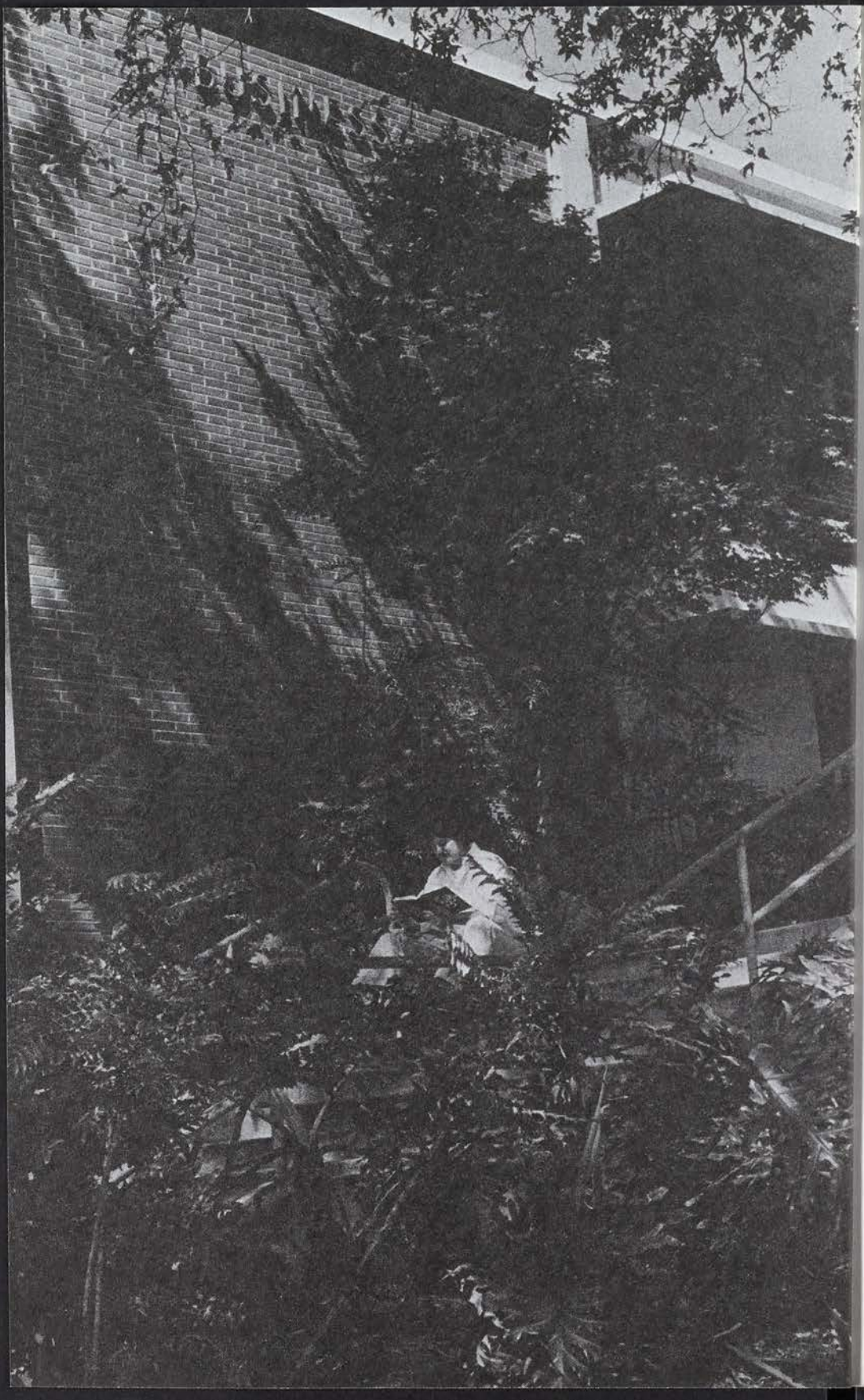
Contemporary accounting theory with emphasis upon pronouncements of the American Institute of Certified Public Accountants, the American Accounting Association, and the Securities and Exchange Commission. 2 lectures. Prerequisites: ACC 401, 402, 403 or consent of instructor.

ACC 478 C.P.A. Practice Problems (4)

Preparation for practice section of Uniform CPA Examination. Review of recent examinations and suggested approaches to typical problems. 2 lectures, 3 activity sessions. Prerequisites: ACC 401, ACC 402, ACC 403 or consent of instructor.

ACC 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.


BUSINESS

COMPUTER INFORMATION SYSTEMS

Donald B. Medley, *Chair*

Thomas H. Athey
Donald L. Bell
Ronald W. Eaves
Koichiro R. Isshiki
Robert Lawrence
Ida Mason
Christopher W. Pidgeon
Richard H. Smith
Robert V. Stumpf
Lavette Teague
Ward D. Testerman
Gerald E. Wagner

The computer profession attracts many creative and hardworking people because they find this dynamic field exciting, challenging, and rewarding.

The Cal Poly approach to computer information systems is unique in the field of computer education in several ways. First, the computer information systems courses are integrated with a fundamental core of business administration courses to meet the needs of the major job market, business and government. Second, the program concentrates on the practical application of how to use the computer to help solve management problems, rather than the engineering aspects of how to design the internal workings of a computer. Third, the program is designed with the student in mind—he or she is prepared not only for well paid employment but also a lifetime of learning and professional growth.

A student majoring in computer information systems will become prepared to seek employment in a variety of computer related positions such as programmer, systems analyst, data base administrator, project leader, and data processing manager.

Additionally, if more advanced schooling is desired, the student's preparation will enable him/her to further specialize in information systems at the graduate level or transfer easily to more generalized business areas.

The Computer Information Systems Department offers a minor in Business Computer Programming. The purpose of this minor is to develop marketable skills for a person not able to find immediate employment in his or her chosen field. Also those students majoring in technical fields that involve the use of the computer may wish to develop adjunct skills that may prove to be complementary to their major course of study. Please see the Department Chair, Building 6, Room 219, 598-4238 if you are interested in enrolling in this minor.

CORE COURSES FOR MAJOR

(Required of all students)

Financial Accounting	ACC	124	(4)
Financial Accounting	ACC	125	(4)
Intro to Computer Systems	CIS	110	(4)
Legal Envir. of Bus. Trans.	FRL	201	(4)
Prin of Org Theory & Beh	BUS	301	(4)
Principles of Marketing	MKT	301	(4)
Managerial Statistics	OM	314	(4)
Production & Operations Mgt	OM	331	(4)
Management Policies & Sys	BUS	410	(4)
or Mgmt Policies & Sys	BUS	411	
Applic Prog Development I	CIS	144	(4)
Applic Prog Development II	CIS	244	(4)
Structured Sys Anal Methods	CIS	245	(4)
Structured Systems Design	CIS	315	(4)
Database Program Develop	CIS	324	(4)
Systems Planning	CIS	335	(4)
Applied Systems Devel Proj	CIS	435	(4)
Information Resource Mgt	CIS	458	(4)
EACH CIS MAJOR WILL SELECT 1 COURSE (4 UNITS) FROM THE FOLLOWING:			(4)
Small Bus Software Proj	CIS	424	
Applied Prog Project	CIS	454	
EACH CIS MAJOR WILL SELECT 2 COURSES (8 UNITS) FROM THE FOLLOWING:			(8)
Computer Applic in Mgt Sci	CIS	316	
Small Business Computers	CIS	360	
Assembly Language Prog	CIS	364	
Advanced Database Concepts	CIS	414	
EDP Auditing	CIS	433	
Comparative Prog Lang	CIS	434	
Distributed DP Systems	CIS	457	

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Amer Civiliz	AMC	201	(4)
or Intro Am Govt	PSL	201	
Amer Civiliz	AMC	202	(4)
or U.S. History	HST	202	
Princ of Economics	EC	201	(4)
Princ of Economics	EC	202	(4)
Freshman Composition	ENG	104	(4)
Intro to Statistics	STA	120	(4)
Additional Units of General Education, including at least 8 units of upper division			(44)
Other electives to exclude business, economics, or public administration			(6)
Business Finance	FRL	301	(4)
Intro. Org. Behavior	MHR	318	(4)
Acctg Information Sys	ACC	305	(4)
or Intermediate Accounting	ACC	301	(4)
EACH CIS MAJOR WILL SELECT THREE COURSES (12 UNITS) FROM THE FOLLOWING:			(12)
Cost Accounting	ACC	211	
Auditing Principles	ACC	419	
Communications for Mgt	MHR	324	
Training & Development	MHR	405	
Adv Org Behavior	MHR	438	
Marketing Communication	MKT	208	
Legal Environ of Bus-Org	FRL	302	
FREE ELECTIVES			(16)

MINOR IN BUSINESS COMPUTER PROGRAMMING

The Computer Information Systems Department provides non-CIS majors with the opportunity to acquire programming expertise in the area of business applications program development by completing the requirements for Minor in Business Computer Programming as outlined below. The purpose of this minor is (1) to develop marketable skills for people with majors other than Computer Information Systems, (2) for those students majoring in technical fields that involve the use of the computer, and (3) for those students who wish to gain a much better understanding of the computer for personal use.

For more information or to enroll in the minor, please contact the CIS department Secretary in Building 6—Room 219, Extension 4238.

Core Requirements (28 units)

Financial Accounting	ACC	124	(4)
Intro To Computer Systems	CIS	110	(4)
Applic Program Development I	CIS	144	(4)
Applic Program Development II	CIS	244	(4)
Structured Sys Anal Method	CIS	245	(4)
Structured Sys Design	CIS	315	(4)
Database Program Develop	CIS	324	(4)
Select one additional course from the following list:			(4)
Small Business Computers	CIS	360	
Assembly Lang Programming	CIS	364	
EDP Auditing	CIS	433	
Comparative Prog Lang	CIS	434	
Distributed DP Systems	CIS	457	

Course Descriptions

CIS 110 Introduction to Computer Systems (4)

Introduction to computers, its capabilities and limitations. Programming a computer as a problem-solving tool. Uses and impact of computers in society. 4 lectures.

CIS 144 Applications Program Development I (4)

Fundamentals of computer programming. Use of flowcharts and new programming technologies such as modular, top-down, and structured programming. Includes typical business applications and how a computer program is developed. 4 lectures and programming projects. Prerequisite: CIS 110.

CIS 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CIS 204 Survey of Cobol Based Systems (4)

The data processing function as viewed by the requestor and user of computer oriented information systems. The development and control of typical business sytems. Computer programming projects using COBOL. Not available for credit to computer information systems majors. 4 lecturers and projects. Prerequisite: CIS 110.

CIS 210 Computer Systems and Services for Small Businesses (4)

Review of the hardware, software and services currently available and specifically designed for small businesses. The evaluation and selection process as well as problems of managing and using small in-house computers and outside services will be stressed. 4 lecture-discussions with major case problems. Not available for credit for computer information systems majors. Prerequisites: CIS 110 and ACC 124 or permission of the instructor.

CIS 214 Computing with Canned Packages and FORTRAN (4)

Problem solving on the computer using both Canned Packages and FORTRAN language on a timesharing system. Includes creating, changing and using data sets. 4 lectures and projects. Prerequisite: CIS 110.

CIS 225 Systems Approach to Problem Solving (4)

To provide the student with a systematic methodology for solving a wide variety of complex real world problems. Analysis of case studies and/or an individual system study will be performed using this systems approach. 4 lectures.

CIS 244 Applications Program Development II (4)

An advanced course stressing structured techniques of applications program design and development to solve business problems using the COBOL language. 4 lectures and programming projects. Prerequisite: CIS 144.

CIS 245 Structured Systems Analysis Methods (4)

The application of structured tools and techniques for describing processes, data flows, data structures, logical file structures, and systems specifications. An overview of the system life cycle. A written report is required. 4 lectures and projects. Prerequisite: CIS 110.

CIS 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

CIS 315 Structured Systems Design (4)

Strategies and techniques of structured design. Structure charts. Derivation of a system design from data flow diagrams. Individual project and report to management involving analysis and design of a computer-based business system. 4 lectures and projects. Prerequisites: CIS 244 and CIS 245.

CIS 316 Computer Applications in Management Science (4)

Analysis, modeling, and solving of quantitative business problems using student-prepared and standard statistical computer programs. 4 lectures and projects. Prerequisites: CIS 144 and OM 315, or permission of instructor.

CIS 324 Database Program Development (4)

Practical problems in the use of information storage and retrieval techniques. Includes sequential and random file organization, building and using directories, developing hashing algorithms using an inverted file structure and other file management methods. 4 lectures and programming projects. Prerequisite: CIS 315.

CIS 335 Systems Planning (4)

Relationship of the information systems planning process to the overall business goals, policies, plans, management style, and industry conditions. Methods of selecting large systems projects; assessing the installation's current state; determining processing, staffing, software and hardware acquisition, and financing approaches. 4 lectures and case studies. Prerequisites: CIS 315 and CIS 324.

CIS 360 Small Business Computers (4)

A survey of small computer systems for business. Hardware, software, data communications and the evaluation and selection of these systems. 4 lectures and projects. Prerequisite: CIS 335.

CIS 364 Assembly Language Programming (4)

Advanced applications of symbolic addressing concepts, address modification, macro instructions and assemblers. Use of assembly programs to optimize computer characteristics in processing data. 4 lectures and programming projects. Prerequisite: CIS 244 or permission of instructor.

CIS 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CIS 414 Advanced Database Concepts (4)

Investigation and application of advanced database concepts including database administration, database technology, selection and acquisition of database management systems. Practicum in data modeling and system development in a database environment. 4 lectures and case studies/projects. Prerequisite: CIS 335.

CIS 424 Small Business Software Project (4)

Evaluation, selection and modification of canned application packages. System design considerations specific to small installations. RPG programming and case studies. 4 lectures. Prerequisite: CIS 324 or permission of instructor.

CIS 433 EDP Auditing (4)

Fundamentals of EDP auditing. Understanding EDP controls, types of EDP audits, risk assessment and concepts, and techniques used in EDP audits. Includes case studies. 4 lectures. Prerequisite: ACC 419 or CIS 335 or permission of instructor.

CIS 434 Comparative Programming Languages (4)

A comparison of several higher level programming languages. Definition, history, standardization problems, structure, capabilities and limitations of each language. Programming practice in several types of languages. 4 lectures and programming projects. Prerequisite: CIS 244 or permission of instructor.

CIS 435 Applied Systems Development Project (4)

Synthesis and integration of systems analysis, systems design, and business information systems concepts, principles, and practices in the development of computer-based information systems. Application of technical, managerial, communications, and interpersonal skills to a realistic business project in a team environment. 4 lectures and major team project. Prerequisite: CIS 335.

CIS 441, 442 Internship in Data Processing (1-8) (1-8)

Faculty supervised on-the-job educational experiences in a real world data processing environment. Allocation of credit is dependent on the nature of the work done and the number of hours worked. Students usually receive pay for participation. Prerequisite: permission of the internship coordinator.

CIS 454 Applied Programming Project: (4)

Application of computer programming and system development concepts and principles to a comprehensive project. A team approach is used to develop a working solution to a realistic business application. Both oral and written presentations are required. 4 lectures and major team project. Prerequisite: CIS 335.

CIS 457 Distributed Data Processing Systems (4)

Study of distributed computer systems, hardware, data terminal devices, communications media, types of data communications services, line protocols, and networks. 4 lectures. Prerequisites: CIS 245 and CIS 324 or permission of instructor.

CIS 458 Information Resource Management (4)

Organization decision-making and behavioral problems confronted by the top and middle management in the automation of data processing activities with special emphasis on these problems within the Information Systems Department. 4 lectures. Prerequisites: Senior standing and CIS 335 or permission of instructor.

CIS 463 Information Systems Seminar (2)

Research and discussion of current problems, employment opportunities, and developments in information systems. 2 lecture discussion hours. Prerequisite: senior standing or permission of instructor.

CIS 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

FINANCE, REAL ESTATE, AND LAW

Hyung K. Jin, *Acting Chair*

Richard J. Bergstrom	Gilbert J. McKee	Alvin C. Ruppert
Michael T. Carney	Eric J. McLaughlin	Peter G. Sibbald
W. Slater Hollis	Samuel N. Njuguna	Paul F. Weisend
Djavad Kashefinejad	David L. Parry	N. Greg Young

The current business climate is a result of vast growth in all segments of the United States financial markets. The finance, real estate and law department at Cal Poly has designed specific courses of practical importance in financial management, securities analysis, real estate, urban land development and business law.

Students in the major may select those courses which best prepare them for a career in their specific area of interest.

The finance area offers academic preparation needed for managers in the banking and savings and loan industry as well as preparing students to work as budgeting or financial analysts in the corporate section of the business community.

Available courses in securities analysis prepare the student for careers in securities brokerage, public finance and bonding, pension fund and banking trust operations and institutional lending practices as carried out by the local loan officer.

The real estate program is designed to emphasize the private real estate market, brokerage, mortgage lending, appraisal, title operations, real property investment analysis, and property management.

Urban land studies and development examine the public or governmental aspects of real property, real estate law, site acquisitions, municipal planning, public finance, taxation policies, and careers related to these general areas of study.

The department offers a minor in business law. This minor is designed to give students an orientation of business and the law.

COURSES IN MAJOR

CORE

(Required of all students)

School-wide core:

Financial Accounting	ACC	124	(4)
Financial Accounting	ACC	125	(4)
Intro to Computer Systems	CIS	110	(4)
Legal Environ of Bus. Trans.	FRL	201	(4)
Principles Organization Theory & Behavior	BUS	301	(4)
Principle Marketing	MKT	301	(4)
Managerial Statistics	OM	314	(4)
Production & Operations Management	OM	331	(4)
Management Policy & Systems	BUS	410	(4)
or	BUS	411	(4)

Plus a minimum of 20 units of directed electives to be chosen from the following:

FRL 280	(4)	FRL 420	(4)
FRL 283	(4)	FRL 433	(4)
FRL 286	(4)	FRL 450	(4)
FRL 324	(4)	FRL 453	(4)
FRL 327	(4)	FRL 460	(4)
FRL 328	(4)	FRL 480	(4)
FRL 330	(4)	FRL 483	(4)
FRL 357	(4)	FRL 486	(4)
FRL 367	(4)	FRL 490	(4)
FRL 383	(4)		

MAJOR

Managerial Accounting	ACC	310	(4)
Real Estate Law	FRL	283	(4)
or Legal Env of Bus Org	FRL	302	
Introduction to Fin Mgmt	FRL	304	(4)
Introduction to Fin Mgmt	FRL	305	(4)
Bus Forecasting & Fin Plan	FRL	363	(4)
Theory of RE Prin & Prac	FRL	380	(4)
Financial Institutions	FRL	430	(4)
Eval of Fin Pol	FRL	440	(4)
or Senior Proj	FRL	461	
and Senior Proj	FRL	462	

Select 12 units from the following:

ACC 310	(4)	EC 432	(4)
CIS 214	(4)	FRL 326	(4)
EC 311	(4)	MHR 318	(4)
EC 313	(4)	OM 315	(4)
EC 401	(4)	OM 434	(4)
EC 404	(4)	UP 301	(4)
EC 405	(4)		

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Amer Civiliz	AMC	201	(4)
or Intro Am Govt	PLS	201	
Amer Civiliz	AMC	202	(4)
or U.S. History	HST	202	
Prin of Economics	EC	201	(4)
Prin of Economics	EC	202	(4)
Freshman Comp	ENG	104	(4)
Intro to Stat	STA	120	(4)
Additional units of general education (including MHR 318 (4) and 8 additional upper division units with the approval of an advisor)			(52)
Other electives to exclude business, economics or public administration			(8)

MINOR IN BUSINESS LAW

This minor provides the student with an orientation of business and the law.

Required:

Legal Environ. of Bus. Trans.	FRL	201	(4)
Legal Environment of Business Organization	FRL	302	(4)

Select 12 units from the following:

Law for Everyday Living	FRL	101	(4)
Hotel & Restaurant Management Law	FRL	310	(4)
Government Regulation of Business	FRL	401	(4)
Legal Environment of Labor Relations	FRL	406	(4)
Entrepreneurial Law	FRL	407	(4)
Legal Aspects of International Business	FRL	426	(4)

Select one of the following with approval of a business law professor:

Labor Economics (EC 202)*	EC	414	(4)
Real Estate Law (FRL 106 or Consent)*	FRL	283	(4)
Legal Environment of Marketing (MKT 302 or Consent)*	FRL	419	(4)
Legal Implications of Financial Transactions (FRL 301 or FRL 305)*	FRL	403	(4)
Contract Administration	FRL	325	(4)
Contract Administration (OM 307)*	FRL	413	(4)

* Course prerequisite

Minor in Financial Management of Public and Private Contracts. *

This minor provides the student with a concept of Contract Administration.

Contract Admin.	FRL	325	(4)
Contract. Aspects of UCC	FRL	326	(4)
Contract Case Study	FRL	327	(4)
Contract Cost Price	FRL	328	(4)
Leg. Env. of Mkt.	FRL	419	(4)
Purchasing	OM	434	(4)

* Prerequisite: FRL 301, or 304 and 305.

Course Descriptions

FRL 100 Personal Money Management (4)

Examines the major financial problems of the household in allocating resources and planning expenditures. Topics include budgeting, housing, consumer protection, insurance, the use of credit, savings, and investments. Not open to finance majors. 4 lecture-discussions.

FRL 101 Law for Everyday Living (4)

Legal principles which underlie ordinary transactions such as buying a house, a television, writing a check, getting married, taking out an insurance policy, joining a union, lending a car to a friend, signing a lease, and hundreds of everyday activities. 4 lecture-discussions.

FRL 106 Real Estate Principles and Practices * (4)

Introduction to real estate brokerage and investments; the nature and classification of real property, and fundamental theories of urban growth, land utilization and property valuation. An overview of real estate finance, property management and the development process is also presented. 4 lecture-discussions.

FRL 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

FRL 201 Legal Environment of Business-Transactions (4)

Jurisprudential concepts. The adversary system of justice. Business-related torts. Contracts per Uniform Commercial Code; sales law (emphasis product liability, warranties, strict tort liability); real property; personal property; secured transactions. Case analysis, 4 meetings.

FRL 280 Real Estate Appraisal Theory (4)

An analysis of various approaches or measures of value as applied to all real property, with emphasis on urban properties. A survey of the value theory concepts as related to practical application through use of specific problem solving via the application of real property evaluation through demonstration reports. 4 lecture-discussions. Prerequisite: FRL 106 or consent of instructor.

FRL 283 Real Estate Law * (4)

Rights and liabilities surrounding the acquisition, possession and transfer of real propety. Definition and description of land including easements, deeds, zoning ordinances, mortgages, foreclosure actions, landlord and tenant relationships. 4 lecture-discussions. Prerequisites: FRL 106 or the equivalent, and FRL 201.

FRL 286 Real Property Management * (4)

A study of the general practices and legal aspects of property management. Topics include establishing rental schedules, tenant billing, rent collection, lease clauses, lease negotiations, purchasing procedures related to repairs and maintenance, and property management accounting. 4 lecture-discussions. Prerequisite: FRL 106 or equivalent and FRL 283.

FRL 299 Special Topics for Lower Division Students (4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

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* Satisfies educational requirement for Real Estate Broker's License.

FRL 302 Legal Environment of Business-Organizations (4)

Background of economic and legal environment of profit and not-for-profit organizations including ethical considerations and affecting social and political influences. 4 lecture-discussions.

FRL 304 Introduction to Financial Management (4)

This is the first of a two-course sequence for Accounting, Finance, or Management of Human Resources majors. Principles of financial management. Topics include taxes, present value analysis, valuation, risk-return trade off, financial analysis, financial forecasting, working capital management and capital budgeting. 4 lecture-discussions. Prerequisite: ACC 125.

FRL 305 Introduction to Financial Management (4)

This is the second of the two-course sequence starting with FRL 304. Topics include sources of financing, cost of capital, leverage, capital structure, dividend policies, and international financial management. 4 lecture-discussions. Prerequisite: FRL 304.

FRL 310 Hotel and Restaurant Management Law (4)

Fundamentals of law which are of particular importance to hotels, restaurants, resorts and associated business; includes duties, rights and liabilities of the innkeeper-host and the guests. Cases. 4 lectures. Prerequisite: FRL 201.

FRL 325 Contract Administration (4)

Organization, procedures and areas of application in contract administration. Designed to provide the student with knowledge and skills essential to accomplish the responsibility of contract administration. Provides a comprehensive approach to the interrelationship between contract administration and various functional disciplines. Prerequisites: FRL 302 and OM 307.

FRL 326 Contract Aspects of the Uniform Commercial Code (4)

Provide transition from common law background to the UCC; current materials on UCC; formation of sales contract; contrasting UCC with contracts in business law. Built around framework of integrated commercial relationship arising from warranty law, strict liability. Insight regarding policy considerations; mechanical requirements. Article #2, #6, #7.

FRL 327 Contract Case Study/Practical Application (4)

Current as well as past cases in both government and private contracting will be reviewed via the case study method. Combined class textbook and library assignments will be employed. Cases selected by areas will be briefed, discussed and reviewed.

FRL 328 Contract Cost/Price Techniques-Negotiation (4)

Provide understanding of cost/price techniques applicable to public/private prime/sub contracts. Entire cost/price process including new business, changes, terminations. RFQ-RFP-IFB analysis, proposal preparation, estimating methodology, pricing strategies, cost/price analysis, negotiation support. Familiarize with analytical and econometric techniques in preparing contracts.

FRL 330 Investment Analysis (4)

Introduction to the behavior of security markets and individual investment policy. Quantitative and qualitative aspects of risk and return associated with investment decisions. Fundamental, technical and random-walk approaches to valuation. 4 lectures. Prerequisite: FRL 301 or FRL 305.

FRL 357 Fundamentals of Risk and Insurance (4)

Economic, legal, and organizational aspects of insurance are investigated. Property and casualty insurance for personal and business uncertainties are covered. Emphasis is on the insurance mechanism as a tool for handling risk. Analysis of case problems dealing with current trends. 4 lecture-discussions. Prerequisite: FRL 201.

FRL 363 Business Forecasting and Financial Planning (4)

Use of linear optimization methods and basic forecasting techniques as they relate to financial analysis. Lectures and problem solving sessions and the use of computer terminals to aid calculations. 4 lectures. Prerequisite: OM 314.

FRL 367 Corporate Finance Theory (4)

The theory of financial decision-making under uncertainty. Emphasis is on the acquisition of funds, capital structure, allocation of funds, the cost of capital, and analysis and measurement of risk. Prerequisites: FRL 305 and OM 314.

FRL 380 Theory of Real Estate Principles and Practices * (4)

Introduction to the practice of real estate related construction industry. Topics include the classification of real property, theories of urban growth, land utilization concepts, property valuation and overviews of real estate brokerage, finance, property management and development. 4 lecture-discussions. Prerequisite: FRL 301 or FRL 304.

FRL 383 Real Estate Finance * (4)

Instruments of real estate, financing and their use; analytic factors in financing and investment decision-making; and analysis of the various institutions which are sources of real estate financing. 4 lecture-discussions. Prerequisite: FRL 106 or FRL 380, or consent of instructor.

FRL 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

FRL 401 Government Regulation of Business (4)

The course is intended to acquaint current and future business persons with recent developments under statutory regulation of business by the Federal Government. Social Security, Anti-trust, Trade regulation, labor law and privacy legislation. 4 lectures. Prerequisite: FRL 302 or equivalent.

FRL 403 Legal Implications of Financial Transactions (4)

An analysis of the legal structure, rationale and implication of commercial transactions involving specialist in finances, accounting, and data processing. Special emphasis will be placed upon secured transactions (involving goods, real property and personal property) negotiable instruments and documents of title suretyship and guarantee, letters of credit and bulk transactions. 4 lectures. Prerequisite: FRL 301 or FRL 305, FRL 302, or equivalent.

FRL 406 Legal Environment of Labor Relations (4)

A course designed to cover the history and application of labor law and problems in the United States. The statutes which support the right to organize as well as court rulings on the matters and situations leading to the federal, state and and court laws being created. The position to be taken by management and the position labor has to assume. 4 lectures. Prerequisite: senior standing.

FRL 407 Entrepreneurial Law (4)

A practical preventive law course emphasizing the legal consideration involved in business planning, operation, financing and dissolution. Particular attention will be given to liability of business managers and accountants, and the legal alternatives available to a financially distressed business. 4 lectures. Prerequiste: FRL 302.

FRL 419 Legal Environment of Marketing (4)

A critical analysis of the Federal laws relevant to the marketing process and assessment of the legal problems growing out of current marketing strategies. Hypothetical case analyses. 4 lecture-discussions. Prerequisite: FRL 302, MKT 302, or permission of instructor.

FRL 420 Financing Small Business (4)

Financial considerations paramount to the entrepreneur. Practical problems unique to the small firm and venture capital. Group analysis, discussion and casework will be employed. 4 lectures. Prerequisite: FRL 301 or FRL 305; or consent of instructor.

FRL 426 Legal Aspects of International Business (4)

A study of the legal factors affecting organizations involved in international business transactions. Topics include: sales, bills of exchange, patents, obligations and liabilities of cargo carriers, political risks and credit insurance. 4 lecture-discussions. Prerequisite: FRL 302 or FRL 312 or consent of instructor.

FRL 430 Financial Institutions (4)

A study of the institutional sources of funds and their relationship to the capital and money markets. 4 lectures. Prerequisite: FRL 301 or FRL 305.

FRL 433 Seminar in Portfolio Management and Capital Markets (4)

Developing and valuating alternative portfolio selection models for individual and institutional use. Examination of non-traditional investments. 4 lecture/seminars. Prerequisites: FRL 330, FRL 363, and FRL 430.

FRL 440 Evaluation of Financial Policy (4)

A seminar course in finance utilizing comprehensive cases to stimulate the role of the financial manager. 4 lectures. Prerequisites: FRL 301 or FRL 305; and ACC 310.

FRL 441, 442 Internship in Finance (1-8) (1-8)

On-the-job training or internship with a business to gain *new* learning experience. Student submits periodic reports to faculty coordinator and receives one unit of credit for 120 hours of training. Work in FRL 442 must be different from FRL 441. Prerequisite: permission of the coordinator of business internships.

FRL 453 Multinational Financial Management (4)

Examination of the institutional factors and analytical methods of international finance. Sources and instruments of international finance, export-import managing fund transmissions and special problems in evaluating direct investments. Emphasis on case discussion. 4 lectures. Prerequisite: FRL 301 or FRL 305.

FRL 460 Commercial Banking (4)

Examines the functional and operational aspects of commercial banks. Emphasis will be placed on the principles and practices used in asset management, liability management, and liquidity management. Group analysis using case problems and/or computer simulations. 4 lecture-discussions. Prerequisite: FRL 430.

FRL 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report is required. Prerequiste: senior standing. Required minimum of 120 hours.

FRL 463 Undergraduate Seminar (2)

Study and discussion by students of recent developments in the student's major field. 2 lectures. Prerequisite: senior standing or permission of instructor.

FRL 483 Real Estate Market Analysis * (4)

The objective of the course is to learn how to prepare market demand studies for use in real estate investment analysis and feasibility studies for development projects. 4 lecture-discussions. Prerequisite: FRL 280 and 380.

FRL 486 Real Estate Investment Analysis * (4)

Review of various techniques for analyzing real estate investments in post-development phase projects. Integration of market analyses, appraisal methods, real estate tax law and traditional financial analysis techniques to evaluate the risk-return characteristics of investment positions in real properties. Prerequisites: FRL 283 and FRL 383.

FRL 490 Urban Land Development * (4)

A review of the process for developing real properties, emphasizing site selection techniques, land purchasing procedures, methods conducting feasibility studies, including market studies, financial analysis and building design. 4 lecture-discussions. Prerequisite: FRL 483 or 486.

FRL 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

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HOTEL, RESTAURANT AND TRAVEL MANAGEMENT

Angelo Bentivegna, *Chair*
Donald E. Lundberg Robert W. Small Leonard E. Zehnder
Ralph M. Scarrow
Adjunct Professors
Al Levie Raymond Marshall Patrick Terrail

The program in hotel, restaurant and travel management is designed to meet the growing need for managers in this rapidly expanding segment of the service sector of our economy. Opportunities for building successful careers in the hospitality field are excellent, particularly in California and the Western States.

The major focus of the program is to develop those managerial skills, abilities, and competencies essential to all professional managers, with concentration on those characteristics needed for managing hotels, private clubs, restaurants and related operations.

In addition to developing basic skills in management, majors in this program are expected to gain insight into the financing of hospitality ventures, the mechanics of operations and the interrelationships of the lodging, food service, travel and leisure industries. Economic, social, legal and environmental trends are studied as they impact on the hospitality business.

Laboratory experiences in food preparation and service, nutrition, interior design, hotel and restaurant administration, property management, field trips, and research are part of the course of study. Each student is required to complete eight hundred (800) hours of work experience prior to graduation, in employment of his or her choice. The Kellogg Foundation Center for Continuing Education (Kellogg West) offers the intern opportunities for on-the-job training in food purchasing and food service supervision.

CORE COURSES FOR MAJOR

Financial Acctg	ACC	124	(4)
Financial Acctg	ACC	125	(4)
Intro Comp Systms	CIS	110	(4)
Leg Env Bus Trans	FRL	201	(4)
Prin of Marketing	MKT	301	(4)
Prin of Mgt	BUS	301	(4)
Quant Meth Admin	OM	314	(4)
Prin of Finance	FRL	301	(4)

Select one course from each of the following four areas with consent of advisor (16 units total):

1. Comp Inf Syst (CIS) ..... (4)
2. Finance, Real Est & Law (FRL) ..... (4)
3. Mgt & Human Resources (MHR) ..... (4)
4. Marketing Mgt (MKT) ..... (4)

HRT Core Req. Courses

Intro to Leis Ind	HRT	101	(4)
Mgt Fd Prd Syst	HRT	250	(4)
Fd & Bev Cost Cnt	HRT	302	(4)
Property Mgt	HRT	305	(4)
Hotel & Rest Dev	HRT	306	(4)
Hotel & Rest Law	FRL	310	(4)
Hotel & Rest Acc	HRT	315	(4)
Catering Mgt	HRT	401	(4)
Rest Mgt	HRT	405	(4)
Hotel Mgt Policy	HRT	410	(4)
Senior Project	HRT	461	(2)
Senior Project	HRT	462	(2)
Undergrd Seminar	HRT	463	(2)

SUPPORT AND DIRECTED ELECTIVES

Gen. Education Requirements:

American Civilization	AMC	201	(4)
or Intro Am Govt	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Principles of Economics	EC	201	(4)
Freshman Composition	ENG	104	(4)
Intro to Statistics	STA	120	(4)

HRT Req. Gen. Ed.:

Advocacy & Arg	SP	204	(4)
Psychology	PSY	201	(4)
Report Writing	COM	216	(4)
Bus & Prof Ethics	PHL	205	(4)

Gen. Education Electives:

32 additional units of Gen. Ed., including MHR 318 (4) and 8 additional units of upper division with the approval of an advisor ..... (36)

HRT Req. Support Courses:

Principles of Economics	EC	202	(4)
Intro to Foods	FN	121	(4)
Food Procurement	FN	354	(3)
Meat Utilization	AS	327	(4)

Select min. 9 units from Group A

Group A

Major Required Support Courses:

(Select min. 9 units w/consent of advisor)			(9)
Contemp Asp Nutr	FN	205	(4)
Quan Food Prep	FN	351	(4)
Inst Mgt	FN	452	(3)
Food Serv Des	FN	453	(4)
Inst Interiors	HE	307	(3)
Travel Mgt	HRT	201	(4)
Wines & Spirits	HRT	215	(4)
H & R French	HRT	220	(2)
Travel Geog	HRT	345	(4)
Intnl Travel	HRT	415	(4)

Unrestricted Electives ..... (8)

800 hours of industry work experience required for graduation.

Course Descriptions

HRT 101 Introduction to the Leisure Industry (4)

Overview of the leisure industry with emphasis on hotel, restaurant and club field. Brief history, description and interrelationships of leisure components. Social and economic forces influencing leisure industry development. Career opportunities and requirements for success in each field. 4 lectures.

HRT 200 Special Problems for Lower Division Students (1-2)

Individual or group investigations, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

HRT 201 Travel Management (4)

Comprehensive study of travel management; its principles, practices, philosophies and systems. Examination of tourism as a developing industry, its travel modes, organizations, laws and social and economic impact. 4 lectures.

HRT 215 Wines and Spirits (4)

Introduction to grapes, wine-making, spirits processing, storage and inventory control of spirits. History, economics, geography, evaluation and comparative tasting of wines. Selection, storage, service of wines, wine lists, wine pricing, wine sales promotion and profits. Wine and food. 4 lectures.

HRT 220 Hotel and Restaurant French (2)

Study of the terminology relating to French wines, French menus (general and regional cuisine), organization of French restaurants and hotels, French culture and geography; basic French expressions used frequently by tourists. 2 lecture-discussions. (Also FR 220)

HRT 250 Management of Food Production Systems (4)

Management concepts applied to commercial food production systems. The course focuses on quality control in quantity foods, food preparation principles and procedures, allocation of resources, use of equipment, facilities design and layout, work simplification, safety and sanitation, production forecasting. 2 hours lecture and 4 hours of activity. Prerequisite: FN 121.

HRT 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

HRT 302 Food and Beverage Cost Controls (4)

Analyzing and controlling costs in food service and beverage operations to create a food and beverage cost control system for any size food and beverage operation. 4 lectures. Prerequisite: ACC 125.

HRT 305 Property Maintenance Management (4)

Application of basic science to the operation and maintenance of electrical and mechanical equipment; refrigeration, heating, cooking, dishwashing, cleaning, etc. Fire protection and safety. Three lectures and one three-hour laboratory.

HRT 306 Hotel and Restaurant Development (4)

Analysis and application of the general principles of marketing to hotel, motel and restaurant operations. A study of the various factors relevant to the development of successful hotels and restaurants. Cases. 4 lectures. Prerequisites: MKT 301.

HRT 315 Hotel and Restaurant Accounting (4)

The comprehensive application of accounting principles to the hospitality industry: accounting practices, financial statements, income/expense account and statements, special purpose journals and ledgers. The application of accounting information in making managerial decisions is stressed. 4 lectures. Prerequisite: ACC 125.

HRT 345 Travel Geography (4)

The geography of tourism and recreation in selected regions of the world. Aspects of physical and cultural geography that directly affect the tourist industry. 4 lecture-discussions.

HRT 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

HRT 401 Catering Management (4)

The marketing and management of catering on-and off-premise special functions. Planning, financing, organizing, marketing and operating the catering service. The student plans, markets, prepares and serves functions in the

Kellogg West Dining Room. Emphasis is on creating and managing catered functions. 2 hours lecture, 6 hours laboratory. Prerequisites: FN 121, HRT 250.

HRT 405 Restaurant Management (4)

Planning a restaurant from concept to opening: location and market, competitor analysis; menu development and pricing; equipment selection; organizing and staffing; feasibility and forecasting income, costs and profits; employee training and management development; promoting and advertising; market auditing. 4 lectures.

HRT 410 Hotel Management Policy (4)

Integrated capstone course on policy determination, including personnel policies. Knowledge and techniques needed to organize and operate hotels and similar hospitality enterprises.

HRT 415 International Travel (4)

Description and analysis of international travel from the view of the traveler and the travel entrepreneur. Problems of travel, destination development, analysis of major international travel destinations. 4 lectures. Prerequisite: HRT 201 recommended but not required.

HRT 441, 442 Internship in Hotel and Restaurant Management (1–6) (1–6)

On-the-job training in some phase of hotel, restaurant or travel. The experience must be new to the student. Analytical reports are made periodically to the faculty coordinator. One unit of credit is granted for each 150 hours of training. Units of college credit are dependent upon departmental approval. Prerequisite: HRT 101 and permission of the instructor.

HRT 461, 462 Senior Project (2) (2)

Management related on-the-job experience; selection of a typical current development or problem in the hotel, restaurant or travel industry; completion of a written project under faculty supervision. Prerequisite: senior standing. Required minimum 120 hours.

HRT 463 Undergraduate Seminar (2)

Research, study and discussion by students of management career opportunities in the hospitality industry. Financial analysis of hotel and restaurant companies. Analysis of personnel policies and management programs relevant to career planning. Current problems. Prerequisite: Senior standing or permission of instructor.

HRT 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

MANAGEMENT AND HUMAN RESOURCES

Gene Houser, *Chair*

John C. Bruckman
Madeline A. Currie
Peter P. Dawson
John T. Flershans, III
David G. Foley
Joyce Kupsh
Reed M. Powell
William Relf
Shiori Sakamoto
Katherine Seibert
Lynn Turner
Warren Weber

This major provides students with a sound background in general management and the opportunity for emphasis in one of a variety of management specialties. Areas of emphasis include general management, administrative management, small business management, organizational behavior, human resources management, and business education.

Department advisors strive to provide programs that meet the educational needs of students who have the following career goals:

1. General manager in a private or public organization of any size.
2. Manager of administrative activities in a private or public office.
3. Manager of a small or medium-sized business. (This program is designed specifically for people who plan to own and operate their own business.)
4. Personnel manager in a private or public organization.
5. Business teacher in a secondary or post-secondary school.

All department programs are designed to provide maximum flexibility in selecting an area of specialty. For example, a freshman can pursue the department curriculum for two years before making a career goal decision. In fact, after two years of study the student can change to any of the business administration majors without loss of academic credits. It is important that students entering Cal Poly for the first time seek the help of an advisor to insure that their individual programs are in their own best interest.

Students interested in fulfilling California State credential requirements for secondary school teachers of business subjects must also coordinate their curriculum with a University Teacher Preparation Center advisor.

CORE COURSES FOR MAJOR IN MANAGEMENT AND HUMAN RESOURCES

(Required of all students)

CORE

Financial Accounting	ACC	124	(4)
Financial Accounting	ACC	125	(4)
Introduction to Computer Systems	CIS	110	(4)
Social, Legal, Political & Economic Environment	FRL	201	(4)
Principles of Organizational Theory and Behavior	BUS	301	(4)
Marketing Principles	MKT	301	(4)
Managerial Statistics	OM	314	(4)
Production and Operations Management	OM	331	(4)
Management Policy and Systems	BUS	410	(4)
or Management Policy and Systems	BUS	411	

MAJOR

Introduction to Financial Management	FRL	304	(4)
Introduction to Financial Management	FRL	305	(4)
Human Resources Management	MHR	311	(4)
Communications for Management	MHR	324	(4)
Undergraduate Seminar	MHR	463	(4)
Select four (4) units from:			
Internship in Bus Mgr	MHR	441–2	(1–4)
OR			
Senior Project	MHR	461–2	(2+2)
OR	BUS	461–2	(2+2)
OR			
Cooperative Education	BUS	470–3	(1–4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Support Courses

Principles of Economics	EC	202	(4)
Each major, with approval of an advisor, will select one of the career-goal elective programs listed below:			(52)

A. General Management
B. Human Resources Management
C. Small Business Management
D. Administrative Management
E. Business Education

General Education

Category I—Communication in the English Language (12 units, lower division)

Freshman Composition	ENG	104	(4)
Report Writing	COM	216	(4)
Advocacy and Argument	SP	204	(4)

Category II—Science and Mathematics (Minimum one laboratory) (16 units)

A. Elementary Statistics	STA	120	(4)
B. One course			(4)
C. One course			(4)
D. One course (may be upper div., Category VII package)			(4)

Category III—Arts, Literature, Philosophy, and Foreign Languages (12 units)

One course from each of areas A, B, and C.

Category IV—Social Sciences (Minimum 12 units. Four units may be upper division, Category VII Package)

Principles of Economics	EC	201	(4)
B. Intra Org. Beh.	MHR	318	(4)
C. One course			(4)

Category V—The Integrated Being (4 units)

General Psychology	PSY	201	(4)

Category VI—U.S. History, Constitution, and American Ideals (8 units) (One course from each group)

Group 1

Introduction to American Government..	PLS	201	(4)
or			
American Civilization	AMC	201	(4)

Group 2

U. S. History Since Reconstruction	HST	202	(4)
or			
American Civilization	AMC	202	(4)

Category VII—Upper Division General Education (See Advisor)

Unrestricted Electives ..... (8)

All students are required to show proficiency in keyboarding and business computations or take MHR 144 and MHR 152.

Students with previous skills in these areas should contact the department secretary.

MINORS IN MANAGEMENT AND HUMAN RESOURCES

The Management and Human Resources Department offers the following minors. The purpose of these minors is to develop marketable skills for a person who may not be able to find immediate employemt in his or her chosen field. Also, those students majoring in fields such as engineering or science may wish to develop adjunct skills that may prove to be complementary to their major course of study. Please see the Minors Coordinator, Management and Human Resources Department, if you are interested in enrolling in one of these minors.

Minor in Administrative Management

(This minor provides non-business majors with an orientation in the operation of a business office.)

Financial Accounting	ACC	124	(4)
Office Administration	MHR	321	(4)
Communication for Mgt	MHR	324	(4)
Information Administra.	MHR	401	(4)
Administrative Mgr.	MHR	402	(4)
Intro to Computer Sys.....	CIS	110	(4)
Electives (School of Business Courses			(12)

Minor in Human Resources Management

(This minor provides non-business students with an opportunity to develop their capability to manage other employees.)

Human Resources Management	MHR	311	(4)
Adv Human Resources Management	MHR	312	(4)
Interpersonal Competence in Organizational Settings	MHR	318	(4)
Managing Career Development	MHR	412	(4)
Advanced Organizational Behavior.....	MHR	438	(4)
Organizational Development	MHR	452	(4)
Electives (School of Business courses)			(12)

Minor in Small Business Management

(This minor is to provide non-business majors with an introductory background needed to start a small business.)

Financial Accounting	ACC	124	(4)
Starting Your Own Business	MHR	104	(4)
Problems of Small Business	MHR	308	(4)
Seminar in New Venture Creation	MHR	408	(4)
Principles of Marketing	MKT	301	(4)
The Social, Legal, Political and Economic Environment of Business	FRL	201	(4)
Principles of Organizational Theory and Behavior	BUS	301	(4)
Electives (School of Business Courses)			(8)

Course Descriptions

MHR 144 Basic Keyboarding (2)

Fundamentals of the touch system on the typewriter or computer keyboard. Individualized format allows each student to tailor course to personal/business needs. 4 one-hour activity periods.

MHR 145 Advanced Keyboarding (2)

Continued development of the touch system on the typewriter or computer keyboard. Individualized format allows student to tailor course to personal/business needs. 4 one-hour activity periods. Prerequisite: MHR 144 or proficiency exam.

MHR 152 Business Computations (4)

A review of basic mathematical concepts with business applications. Emphasis on fractions, decimals, equations, and formulas commonly encountered in business environments. Preparation for advanced study in quantitatively oriented business courses through lectures and computer applications. One two-hour lecture, two two-hour activities.

MHR 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MHR 204 Starting Your Own Business (4)

Identification and comparison of characteristics found in persons who are successful in starting a new business. Investigation of an independent business as a career choice. Steps taken and problems encountered in planning new business ventures. 4 lecture-discussions. Open only to freshmen and sophomore business students and all non-business majors.

MHR 221 Introduction to Word Processing (4)

Development of a modern office through the use of automated equipment and trained personnel. Word processing organization from input to distribution. Equipment available and role of word processing systems personnel. 4 lecture/discussions.

MHR 244 Personal Shorthand (3)

Practical shorthand as a note-gathering tool for managers, reporters, students and general use. The alphabetic Personal Shorthand system is used to achieve speeds of approximately 60 words per minute. 2 hours lecture, 2 hours activity.

MHR 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

MHR 308 Problems of Small Business (4)

Small business hazards and factors in business success. Adequate protection and financing for the small business. Analysis and discussion of typical situation-problems. 4 lectures. Prerequisite: ACC 124; BUS 301; MKT 301.

MHR 311 Human Resources Management (4)

Establishment of human resources objectives and requirements in the organization. Recruiting, testing, interviewing, screening and selection of employees. Employee counseling, training, development, promotion, recreation, insurance and retirement programs. 4 lectures. Case studies and lecture-discussions. Prerequisite: BUS 301 or permission of instructor.

MHR 312 Advanced Human Resources Management (4)

Applied personnel type problems in the corporation job analysis, job descriptions, appraisal, interviewing, testing, training, and development, job satisfaction, equal opportunity and union relations. 4 lectures. Exercises, case studies and lecture. Prerequisite: MHR 311 or permission of instructor.

MHR 318 Interpersonal Competence in Organizational Settings (4)

Involvement techniques for learning concepts and skills relating to interpersonal competence in the managerial environment. Socialization, learning, motivation, preception, personality, communications, leadership style, power, conflict, group dynamics, and face-to-face problem solving and decision making are emphasized. 4 lecture/discussion periods. Prerequisite: Introductory psychology, upper-division status, or permission of instructor.

MHR 321 Office Administration (4)

Application of office theory and skills in the areas of telecommunications, on-line information processing, copy preparation, voice processing, meeting organization, travel arrangements, mail processing and written communications.

MHR 324 Communication for Management (4)

The basic communications objectives of the organization. Types of communication used in organizations, their nature, capabilities and limitations. Conducting conferences, consultations and meetings. Practice in oral and written communications. 4 lectures. Lecturers and discussions. Prerequisite: ENG 104 or permission of instructor.

MHR 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MHR 401 Information Administration (4)

An analysis of the areas of information management and processing, word processing, copy processing, and micrographics. Organized control over the information used for decision making in business, industry, and government. Four lecture-discussions.

MHR 402 Administrative Management (4)

Relationship of office functions to the total business enterprise; planning, organizing, controlling, and actuating in office management; analysis of information needs for management decisions; analytical approach to office services functions; 4 lecture-discussions.

MHR 404 Administrative Systems and Procedures (4)

A study of administrative support systems and procedures; analysis, design, and implementation related to the office area. Problem-solving approach emphasized, requiring application of basic analysis and design techniques in improving administrative support systems. 4 lecture-discussions. Prerequisites: ACC 125, CIS 225, and MHR 401, or consent of instructor.

MHR 405 Training and Development (4)

The role of training as a tool of management, including such topics as: developing and managing programs, determining training needs, improving training techniques, and evaluating training effectiveness. 4 lecture-discussions. Prerequisite: Senior standing.

MHR 406 Changing Managerial Sex Roles (4)

Attitudes regarding male/female roles in management positions will be discussed in seminar and small group format. Current literature, popular and scholarly, will be reviewed and evaluated. Three short papers will be required on current issues. Four seminars.

MHR 407 Business Ethics and Social Responsibilities (4)

The ethical decisions faced by business persons in a society with changing values and increasing international interdependence explored in a lecture/discussion format. The issue of social responsibility will be examined. Papers and projects will be presented to the class. Case studies. 4 lecture-discussions. Prerequisite: Senior standing or permission of instructor.

MHR 408 Seminar in New Venture Creation (4)

An interdisciplinary study and application of the general steps involved in preparing a preliminary venture feasibility analysis, and initiating a small business. Seminar. 4 lecture-discussions. Prerequisite: Senior standing or consent of instructor.

MHR 409 Business Education Management (3)

Approaches to managing the learning/teaching processes used in business education courses. Topics included are instructional objectives, competency-based education, evaluation, individualized instruction, and instructional modules. 3 lecture-discussions.

MHR 412 Managing Career Development (4)

Career development issues such as career transitions, problems, phases and strategies; personal and organizational value conflicts; corporate politics, and the prices of success. 4 seminars.

MHR 424 Advanced Management Communications Seminar (4)

Skill training in adapting to the interpersonal environment of the organization. Activities include setting behavioral goals, letting yourself be known, listening and responding, challenging, and effective work group participation. Seminar. 4 lecture-discussions. Prerequisite: MHR 318 or MHR 324, senior status or consent of instructor.

MHR 438 Advanced Organizational Behavior (4)

Applications of human processes used to achieve goals in the organization. Group experiences whereby students gain insights regarding how their own leadership styles integrate with the managerial functions and roles of the organization. Case studies, group activities, complex organization simulations and lecture-discussions. 4 lecture-discussions. Prerequisite: MHR 318 or consent of instructor.

MHR 441, 442 Internship in Business Management (1–8) (1–8)

On-the-job training in business management involving new, collegiate-level learning experiences. Experiences may be ueful as a basis for senior projects. Prerequisite: consent of internship coordinator.

MHR 452 Emerging Issues in Management (4)

Exploration of contemporary issues facing management in a dynamic, changing societal environment, e.g., business statesmanship, industrial democracy, international problems, comparative management, automation, managing for the future, natural resources and human freedom. 4 lecture-discussions. Prerequisite: Senior standing or permission of instructor.

MHR 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report is required. Prerequisite: Senior standing. Required minimum of 120 hours.

MHR 463 Undergraduate Seminar (2)

Study and discussion by students of recent developments in the students' major fields. 2 lectures. Prerequisite: Senior standing or permission of instructor.

MHR 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

FUNDAMENTALS OF FINANCIAL MANAGEMENT
JAMES C. VAN HORNE

MARKETING MANAGEMENT

James R. Hill, *Chair*

Dolores A. Barsellotti
W. R. Berdine
Patricia Hopkins
Arthur Johnson
Jo Ann Landwehr
Donna I. Qureshi
Charles L. Taylor

The marketing management program is designed to give the student a background of knowledge concerning both factors within the firm and in the external environment as they affect the development and implementation of plans to serve the firm's markets and to attain the firm's economic goals. Emphasis is placed in the areas of determining market needs and the making of product, pricing, promotion and distribution decisions to meet those market needs.

Through proper selection of courses with advisor approval, each student will develop and complete an individualized program of courses that will prepare him or her for a specialized career field within the field of marketing management. The specialized fields from which the student will choose are: (1) advertising, (2) international marketing, (3) marketing research, (4) marketing to professional buyers, (5) retail management, and (6) transportation and distribution management.

CORE COURSES FOR MAJOR

(Required of all students)

Financial Accounting	ACC	124	(4)
Financial Accounting	ACC	125	(4)
Introduction to Computer Systems	CIS	110	(4)
Legal Env. Bus Trans	FRL	201	(4)
Principles of Organization Theory and Behavior	BUS	301	(4)
Principles of Marketing Management	MKT	301	(4)
Managerial Statistics	OM	314	(4)
Production and Operation Management	OM	331	(4)
Management Policies and Systems	BUS	410	(4)
or Management Policies and Systems	BUS	411	
Business Finance	FRL	301	(4)
Product and Brand Management	MKT	302	(4)
Advertising Principles	MKT	307	(4)
Marketing Research	MKT	408	(4)
Buyer Behavior	MKT	411	(4)
Legal Environment of Marketing	FRL	419	(4)
Marketing Analysis and Control	MKT	420	(4)
Marketing Problems	MKT	421	(4)
Undergraduate Seminar	MKT	463	(2)
Plus a minimum of 30 units of courses (including 8 not in Business) with advisor approval			(30)

SUPPORT AND ELECTIVE COURSES

Amer Civiliz	AMC	201	(4)
or Intro Am Govt	PLS	201	
Amer Civiliz	AMC	202	(4)
or U.S. History	HST	202	
Principles of Economics	EC	201	(4)
Principles of Economics	EC	202	(4)
Freshman Composition	ENG	104	(4)
Introduction to Statistics	STA	120	(4)
Additional units of General Education (including MHR 318 (4) and 8 additional upper division units with with approval of an advisor)			(48)
Unrestricted Electives			(26)

MINOR IN MARKETING MANAGEMENT

Students enrolled in other academic programs, especially those outside of the School of Business Administration, may broaden their intellectual base and increase their opportunities for employment by completing an academic minor in marketing management. This minor is designed to supplement student studies in other major fields. Many non-business majors find opportunities for application of the knowledge and academic preparation they have obtained in their major field in the marketing of goods, services and ideas where a knowledge and understanding of marketing principles and practices is a prerequisite for success.

It is possible for students majoring in most other fields to complete the minor in marketing management within the normal requirements of their degree through careful planning and scheduling of their required courses.

The attainment of a minor in marketing management is accomplished by appropriate selection, timely scheduling and satisfactory completion of specifically designated courses and electives totaling a minimum of 32 quarter units as outlined below:

Completion of the following courses is required:

Principles of Marketing Management	MKT	301	(4)
Product and Brand Management	MKT	302	(4)
Buyer Behavior	MKT	411	(4)
Financial Accounting	ACC	124	(4)
Principles of Economics	EC	201	(4)

Select 12 additional units from the following list of courses:

Marketing of Services	MKT	206	(4)
Professional Selling	MKT	208	(4)
Transportation Systems and Traffic Management	MKT	303	(4)
Marketing for Small Business Organizations	MKT	304	(4)
Advertising Principles	MKT	307	(4)
Retail Management	MKT	308	(4)
Business Logistics Management	MKT	309	(4)
Field Sales Management	MKT	310	(4)
Special Problems for Upper Division Students	MKT	400	(2)
Advertising Management	MKT	405	(4)
Industrial Marketing	MKT	407	(4)
Marketing Research	MKT	408	(4)
International Marketing	MKT	414	(4)

Legal Environment of Marketing	FRL	419	(4)
Market Analysis and Control	MKT	420	(4)
Marketing Problems	MKT	421	(4)
Management of Distribution Channels	MKT	431	(4)

Course Descriptions

MKT 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MKT 201 The Consumer, Marketing and Society (4)

Overview of the marketing system as it applies to the needs/wants of consumers. Designed to assist the individual to become an informed and efficient consumer. Discusses advertising, personal selling, pricing and product characteristics as they affect the individual. Consideration of the role of government in consumer affairs. 4 lecture-discussions.

MKT 206 Marketing of Services (4)

Concepts, practices, and development of strategies involved in marketing of services. External environmental and internal control factors as applied to professional, financial, educational, entertainment, health care, governmental, religious, research, media, and other organizations, institutions and/or agencies. 4 lecture-discussions.

MKT 208 Professional Selling (4)

Persuasive personal communication on behalf of products, concepts, services. Individual counseling on oral presentations by students. 4 lecture-discussions.

MKT 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

MKT 301 Principles of Marketing Management (4)

Principles, concepts, and institutions involved in facilitating economic exchanges. Analysis of customers, products and services, external environments, price, promotion, and distribution variables. Planning, implementation, control, and evaluation of marketing strategy. 4 lecture-discussions.

MKT 302 Product and Brand Management (4)

Planning, implementation and control of marketing strategy for a specific product, product line, or brand. Analysis of market needs and the macro-environment; developing marketing plans involving product, price, promotion, and distribution decisions to market a specific product or brand. 4 lecture-discussions. Prerequisite: MKT 301.

MKT 303 Transportation Systems and Traffic Management (4)

Analysis of competitive alternative modes, systems, rates, services and regulations as prerequisite to transport purchase decisions. Organization, operations and management of the firm's traffic department. Impact of present and proposed transportation and environmental developments on industrial and carrier operations. 4 lecture-discussions.

MKT 304 Marketing for Small Business Organizations (4)

The study of the methods by which a small business organization with limited resources can analyze the profit opportunities within its market area. Special emphasis on developing and evaluating a written marketing plan for a small business organization. 4 lectures.

MKT 305 Principles of Marketing (4)

Study of the principles, concepts and institutions concerned with distribution of goods and services. Emphasis on customer orientation, interrelationships with other business functions and the external environment in which marketing functions are performed (government, society, competition, economic conditions and technology). 4 lecture-discussions.

MKT 306 Marketing Management (4)

Analysis, planning, implementation and control of marketing strategy. Determination of product, promotion, pricing and distribution decisions needed to identify and serve the firm's markets, emphasis on analytical techniques to improve decision-making in a dynamic external environment. 4 lecture-discussions. Prerequisite: MKT 305.

MKT 307 Advertising Principles (4)

Role of advertising in the marketing process. Discussion of the different uses of advertising, types of media, how advertising is created, agency functions, legal, social and economic aspects of the industry. Analysis of sales promotion techniques. 4 lecture-discussions. Prerequisite: MKT 302 or permission of instructor.

MKT 308 Retail Management (4)

Examination and evaluation of changing concepts of retailing from a management viewpoint. Philosophy of modern management and measures of retail productivity are employed in individual student field projects. 4 lectures, case study. Prerequisite: MKT 302.

MKT 309 Business Logistics Management (4)

Coordination and administration of materials management and physical distribution activities for optimum logistical performance relative to cost and customer service. Integration of transportation, warehousing, inventory, and related logistical activities. Case analysis and discussion of problems in logistical support. 4 lecture-discussions. Prerequisites: MKT 307 and BUS 301.

MKT 310 Field Sales Management (4)

Analysis of the Field Sales Manager as a professional marketing tactician in a marketing oriented firm. Emphasis on both theoretical and applied approaches utilized to effectively manage a field sales force. 4 lecture-discussions. Prerequisites: MKT 208, 302, or permission of instructor.

MKT 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MKT 405 Advertising Management (4)

Strategic aspects of planning, implementing, and controlling advertising programs from the perspectives of producers and distributors of goods, services, and nonprofit organizations. Study of socioeconomic, legal, and consumer issues affecting advertising decisions in a marketing context. 4 lecture-discussions. Prerequisite: MKT 307.

MKT 407 Industrial Marketing (4)

Study of the environment in which industrial products are marketed to industrial firms, governments and institutions. Emphasis on industry structure, government and industrial buying behavior as each affects product, pricing, promotion and distribution decisions. Analysis of specific case problems. 4 lecture-discussions. Prerequisite: MKT 302.

MKT 408 Marketing Research (4)

Research process as an aid to decision-making in marketing. Fundamental techniques and practical experience in research methodology. Data sources, research design, sampling, investigation, analysis, and presentation of results of field projects. 4 lecture-discussions. Prerequisites: MKT 302, OM 314.

MKT 411 Buyer Behavior (4)

An analysis of the various factors that affect the consumer during the pre-purchase, purchase, and post purchase decision-making process. Emphasis is upon a thorough understanding of the consumer to facilitate the development of effective marketing strategy. 4 lecture-discussions. Prerequisite: MKT 301, 8 units of behavioral and social science or permission of instructor.

MKT 414 International Marketing (4)

Planning and organizing for international marketing operations. Cultural, economic and political influences on business arrangements in overseas markets and development of appropriate strategies. Analysis of management practices and problems. 4 lectures. Prerequisite: MKT 302.

MKT 420 Market Analysis and Control (4)

Market identification and diagnosis using methods of corollary products, statistical derivation, buying intention surveys, test markets and simulation. Market potential analysis based on direct data and buying power indexes. Analytical tools as applied to marketing management for planning and control. 4 lecture-discussions. Prerequisites: MKT 302, OM 314 or permission of instructor.

MKT 421 Marketing Problems (4)

Application of marketing theory to contemporary marketing problems. Emphasis on the techniques of successful marketing decision-making. Problems approach utilized to develop student's ability to integrate all major areas of marketing. 4 lecture-discussions. Prerequisites: MKT 302 and senior standing.

MKT 431 Management of Distribution Channels (4)

Development, design, selection and administration of marketing channel systems. Sources and resolution of channel conflicts. Channel relationships, communication, functional performance and strategy planning. Analysis of selected case problems. 4 lecture-discussions. Prerequisites: BUS 301 and MKT 302.

MKT 441, 442 Internship in Marketing (1–8) (1–8)

Faculty supervised on-the-job educational experience in real world marketing management environment. Allocation of unit credit is dependent upon the nature of the work done, the level of responsibility and the number of hours worked. Prerequisite: Permission of the departmental internship coordinator.

MKT 463 Undergraduate Seminar (2)

Development and refinement of skills and strategies necessary to obtain and enhance employment. Student presentation and discussion of problems and opportunities pertinent to career growth and success as related to personal and family life. 2 meetings. Prerequisite: MKT 302.

MKT 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

OPERATIONS MANAGEMENT

R. Richard Sabo, *Acting Chair*

Leon A. Dale
Danny C. DeCeglie
Guisseppi A. Forgionne
Ralph H. Miller
Charles E. Pinkus
P. Ramalingam
Leonard E. Ross
Richard H. Schoning
G. Dow Worley

The major prepares the graduate for careers in production and general operations management of national and international business, not-for-profit institutions, and government. This major is designed to provide students with the business operations training leading to operations management positions in industrial and service enterprises.

Students may follow their specialized interests in one of the academic subject areas shown below:

Production Management
Management Science/Statistics
Management Policy

A department advisor will help you choose elective courses that are compatible with your career interests in the above academic subject areas.

COURSES IN MAJOR

CORE

(Required of all students)

Financial Accounting	ACC	124	(4)
Financial Accounting	ACC	125	(4)
Introduction to Computer Systems	CIS	110	(4)
Leg. Env. Bus. Org.	FRL	201	(4)
Principles Organization Theory & Behavior	BUS	301	(4)
Principles of Marketing Management	MKT	301	(4)
Managerial Statistics	OM	314	(4)
Production & Operations Management	OM	331	(4)
Management Policies & Systems	BUS	410	(4)
or Management Policies & Systems	BUS	411	

MAJOR:

Business Finance	FRL	301	(4)
Management Principles & Theory	OM	307	(4)
Management Science	OM	315	(4)
Production & Operations Management	OM	332	(4)
Undergraduate Seminar	OM	463	(2)
Internship	OM	441	
	OM	442	
or			
Senior Project	OM	461	
	OM	462	
or			
Research Design	OM	490	(4)
Plus a minimum of 44 units of courses from the list of approved courses which may be obtained from an Operations Management Department advisor.			(44)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	
or			
Introduction to American Government	PLS	201	(4)
American Civilization	AMC	202	
or			
United States History	HST	202	(4)
Principles of Economics	EC	201	(4)
Principles of Economics	EC	202	(4)
Freshman Composition	ENG	104	(4)
Elementary Statistics	STA	120	(4)
Additional units of general education, including MHR 318 (4) and 8 additional upper division units with approval of an advisor			(48)
Other electives to exclude business, economics, or public administration			(8)
Unrestricted Electives			(12)

Course Descriptions

OM 103 Business and Its Environment (4)

American business system in its economic and social environment. A conceptual approach relating business and its legal forms to society as a whole. Career opportunities in business with emphasis on management. 4 lectures.

OM 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

OM 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

OM 307 Management Principles and Theory (4)

Principles and functions of management as a universal process. Analysis of theories of organization and management. 4 lectures.

OM 313 First-line Management (4)

Analysis of the unique position of the supervisor in the industrial operations context; the application of theory and practice in problems at the first level of management. 4 lecture-discussion, case studies and group activities.

OM 314 Managerial Statistics (4)

Business application of techniques that require knowledge of data distributions such as binominal, Poisson, and normal; probability; sampling theory. Use of statistical tests for inference such as estimation, hypothesis testing, Chi-Square, regression and correlation, 4 problem-solving periods. Prerequisite: STA 120.

OM 315 Management Science (4)

Identification and solution of business problems by quantitative methods and techniques. Introduction to quantitative tools of analysis and construction of quantitative models useful in business decision making. Application of electronic computers. Seminars, lectures, and problem solving by small groups. 4 problem-solving periods. Prerequisite: OM 314.

OM 331 Production and Operations Management (4)

Introduction to fundamental concepts of production and operations management. Use of quantitative methods in forecasting, capacity planning, project management, inventory and quality control. 4 lecture-discussions. Prerequisite: OM 314.

OM 332 Production and Operations Management (4)

Application of quantitative methods to problems in production and operations management, including facility location, design of operations and work systems, job simplification, scheduling, motion and time study. 4 lecture-discussions. Prerequisite: OM 331.

OM 333 Practicum in Production/Operations Management (4)

A course designed to integrate and review the theories and methodologies learned in OM 331 and OM 332 by application to the analysis of a specific simulated firm. 4 case study. Prerequisite: OM 332.

OM 350 Decision Support Systems (4)

Identification and solution of business problems in production and operations management, marketing, and finance by quantitative methods and computer applications. Analytical solutions and simulation of business activities on the computer. 4 lecture-discussions. Prerequisite: OM 331.

OM 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

OM 414 Advanced Managerial Statistics (4)

Application of advanced statistical methods to problems in business administration. Advanced techniques of analysis and inference including nonparametric statistics and correlation, hypothesis testing, analysis of variance, multiple regression and correlation. Use of SPSS. 4 lecture/problem-solving/activity sessions. Prerequisite: OM 314.

OM 415 Forecasting Methods for Management (4)

Analysis of Time Series Movements in Business Phenomenon. Trend Analysis, Seasonality, and Cyclical Patterns. Random fluctations. Quantitative forecasting methodologies, including Classical Decomposition, AR, MA, and ARIMA models. 2 seminars, 2 problem-solving and cases. Prerequisites: OM 414 or OM 314 and consent of the instructor.

OM 416 Multivariate Business Analysis (4)

Application of multivariate statistical methods to problems in business administration. Advanced techniques of analysis and inference including multiple regression, multiple discriminant analysis, multivariate analysis of variance, canonical correlation analysis, factor analysis. Use of packaged computer programs (SPSS). 4 lecture-problem-activity sessions. Prerequisite: OM 414 or OM 314 and consent of the instructor.

OM 417 Mathematical Programming for Business Analysis (4)

Resource allocation and planning models. Linear programming and the simplex method; duality and sensitivity analysis. Goal programming and other multiple objectives. Integer and non-linear programming. 4 lecture-problem-activity sessions. Prerequisite: OM 315.

OM 418 Network Analysis for Business Decisions (4)

Methods for planning and analyzing interrelated business events and activities. Program Evaluation and Review Technique (PERT), Critical Path Method (CPM), transportation transshipment, assignment, traveling salesman, shortest route, minimal spanning tree, maximal flow, and dynamic programming models. 2 seminar-discussions, 2 problem solving. Prerequisite: OM 315.

OM 419 Simulation for Business Analysis (4)

Simulation of business activities. Deterministic and stochastic management science models. Simulation of human decision making. Artificial intelligence. Corporate planning models. 4 seminar-discussion-problems, and cases. Prerequisite: OM 315.

OM 420 Decision Analysis for the Manager (4)

Elements of decision theory. Criteria for decision making under uncertainty, risk, and certainty. Decision trees and sequential decision processes. Sensitivity analysis. Value of sample information. Multicriterion decision making. 4 seminar-discussion-problems and cases. Prerequisite: OM 315.

OM 421 Policy for Industrial Relations (4)

Public and private manpower policy in dealing with unions, with emphasis on labor legislation, collective bargaining, and arbitrations. The changing relationship between unions, management, and government. 4 lecture-discussions. Prerequisite: Senior standing and consent of the instructor.

OM 422 Policy for International Management (4)

Policy consideration with regard to cultural, political, social, and economic aspects of doing business abroad will be analyzed. Strategies suitable for international management will be studied to provide students with the necessary knowledge to perform well. 4 lecture-discussions.

OM 431 Manpower Planning and Control (4)

Techniques used by operations managers in deploying human resources at aggregate and unit production planning levels. Considers all of the operating constraints which lead to the development of detailed manpower operations plans and schedules. Examines decision rules and search methods used in the process. Lecture-problem-solving, 4 hours. Prerequisite: OM 332.

OM 432 Work-Flow Planning and Control (4)

Production process decisions involving operations design and organization, including line balancing, physical environment, work methods, processes and measurement. Planned structuring of work-flow and man-machine interfaces in production systems encountered in manufacturing and service industries. 4 lecture-problem-solving. Prerequisite: OM 332.

OM 433 Inventory Planning and Control (4)

Management of physical assets in service and manufacturing organizations. Analysis of facility and inventory planning and control problems, including location and layout of facilities, equipment replacement policies, inventory ordering rules, and inventory control systems. 4 lecture-problem-solving. Prerequisite: OM 332.

OM 434 Purchasing Management (4)

Examines activities directed to securing the materials, supplies, equipment and services required for the proper and efficient functioning of a business, including related planning and policy issues. 2 seminar-discussion, 2 case study. Prerequisite: OM 332.

OM 435 Quality Management (4)

Management of the Quality Assurance function. Analysis of the planning, design, and organization of quality control systems; statistical aids, process control and quality verification techniques needed for effective operations. 2 seminar-discussion, 2 case study. Prerequisite: OM 314 or OM 414 and OM 331.

OM 436 Project Management (4)

Study of techniques for planning a sequence of responsibilities and activities necessary for accomplishing complex projects and techniques for monitoring the allocation of resources to those activities so that they can be accomplished within rigid time and cost constraints. 2 seminar-discussion, 2 problem solving. Prerequisite: OM 332.

OM 437 Case Studies in Production/Operations Management (4)

Individual cases will be assigned to be analyzed in detail by the student. These cases will deal with asset, manpower, and workflow planning and control, and the student will be expected to utilize the tools learned in the given prerequisites. 4 seminar/case study. Prerequisites: OM 431, OM 432, OM 433, or consent of instructor.

OM 441, 442 Internship in Operations Management (1–8) (1–8)

On-the-job training in business management involving new, collegiate-level learning experiences. Experiences may be useful as a basis for senior projects. Prerequisite: consent of internship coordinator.

OM 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report is required. Prerequisite: Senior standing. Required minimum of 120 hours.

OM 463 Undergraduate Seminar (2)

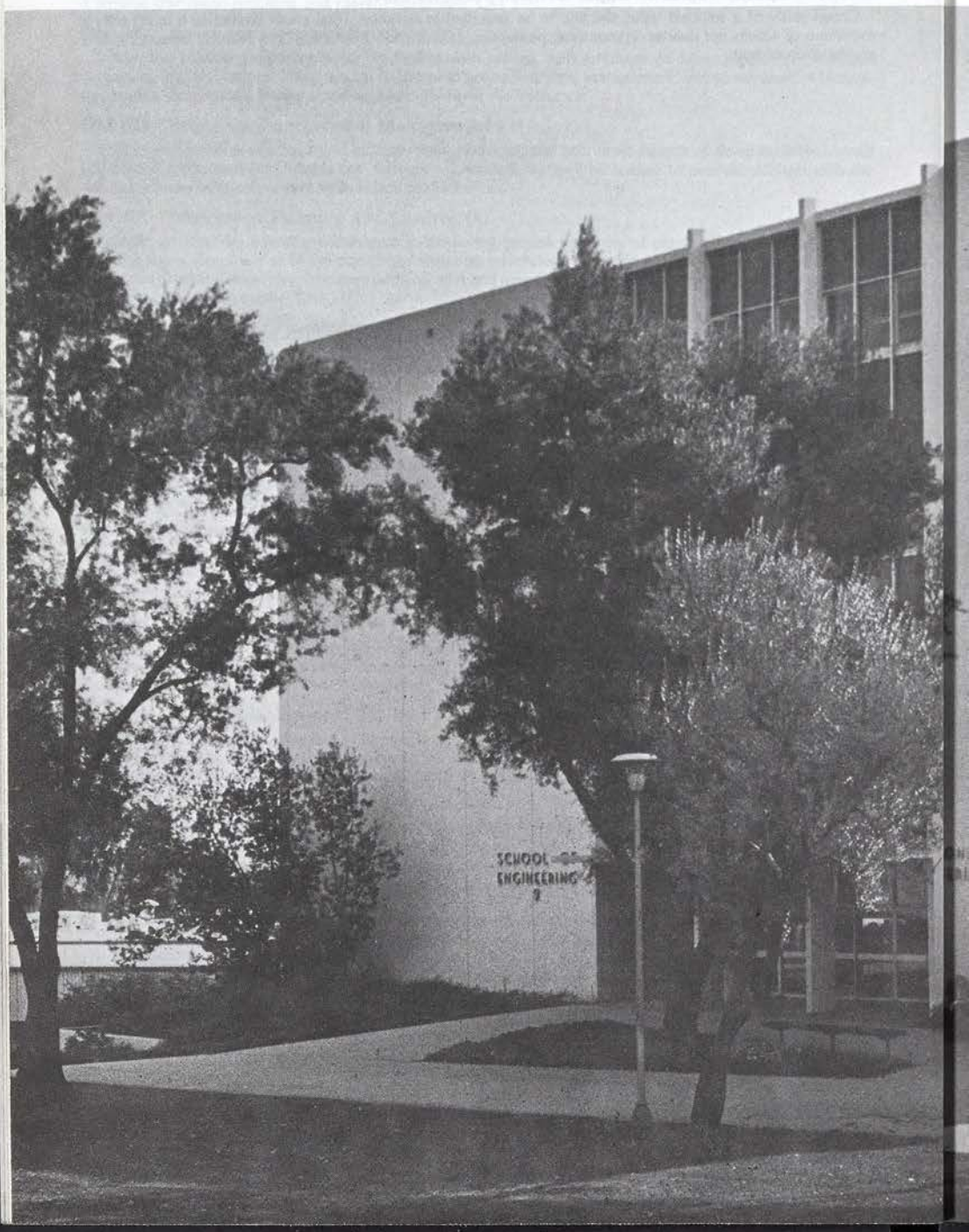
Study and discussion by students of recent developments in the students' major fields. 2 lectures. Prerequisite: Senior standing or permission of instructor.

OM 490 Research Design and Methodology (4)

Identification of problems in a research format. How to state hypotheses, define and collect data, and select analysis techniques. Examination of types of research (ex post facto, laboratory, field or survey) and limitations for inference. Seminar, 4 hours. Prerequisite: OM 314.

OM 499 Special Topics of Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.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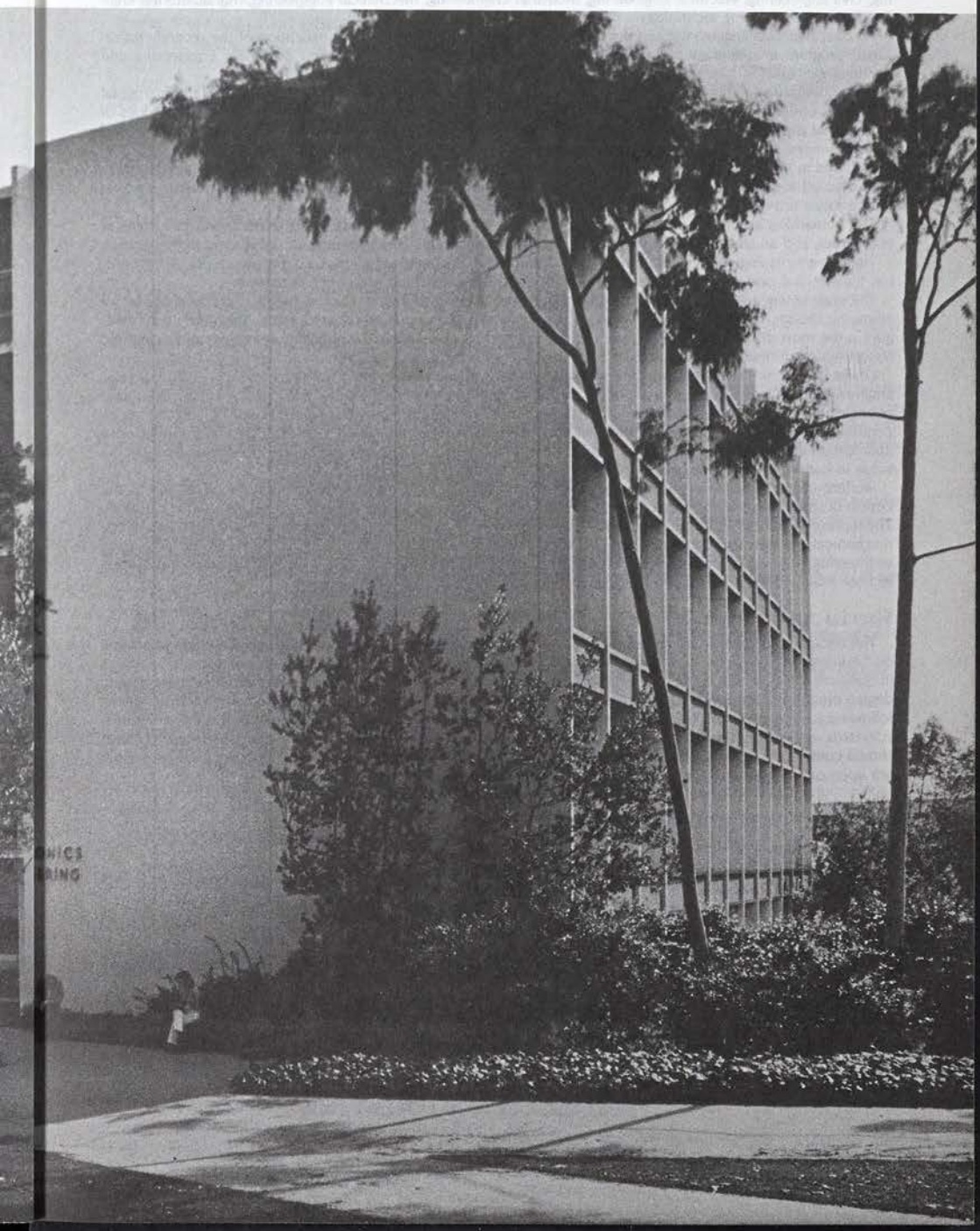
SCHOOL OF ENGINEERING



SCHOOL OF ENGINEERING

Beaumont Davison, *Dean*

Anthony L. Tilmans, *Associate Dean*

The School of Engineering is a professional school whose purpose is to provide both undergraduate and graduate instruction. To accomplish its objectives, the School of Engineering contains seven degree-granting departments.

The School of Engineering offers the degree of bachelor of science in aerospace engineering, chemical engineering, civil engineering, electrical engineering, industrial engineering, mechanical engineering, manufacturing engineering and engineering technology.

All baccalaureate engineering and engineering technology programs with the exception of the recently established program in manufacturing engineering are accredited by the Accreditation Board for Engineering and Technology (ABET).

The undergraduate engineering programs are designed to give the student an understanding of the fundamental priniciples underlying scientific engineering and engineering practice. Each program integrates four categories of educational experience into its curriculum. These categories are: basic sciences and mathematics; humanities and social sciences; engineering sciences; and engineering analysis, design and systems.

Included in the basic sciences and mathematics category are general chemistry, covering inorganic chemistry and selected topics in organic and physical chemistry; physics, including both classical and modern physics; mathematics through calculus and ordinary differential equations.

The humanities and social sciences category consists of United States history and government, principles of economics, and an elective group providing a means of broadening the perspective of the student in humanities.

The category in engineering sciences consists of studies in mechanics of solids, fluid mechanics, thermodynamics, transfer and rate mechanisms, electrical theory and the nature and properties of materials.

The engineering analysis, design and systems category is directed toward the creative and practical phases of economic design, involving analysis, synthesis, and engineering research and development. This curriculum category is the most distinctive feature of the engineering curricula, since it is the element of creative and economic design which distinguishes the engineer from the pure scientist.

Unlike the traditional engineering curricula which initiate course work in the major department in the junior year, engineering orientation courses begin in the freshman year, and are taken concurrently with mathematics, basic science and general education courses. Also, because of the commitments of the School of Engineering to contributing to the total lifestyle of handicapped persons, special education concerns are incorporated into appropriate courses within the School. Thus, students obtain motivation and acquire knowledge of professional value in their chosen field as they progress through their academic career.

Student chapters of major engineering professional societies offer co-curricular opportunities related to the course of study. Several chapters of national engineering honorary societies have also been installed at Cal Poly. The represented societies include Tau Beta Pi, all-engineering; Tau Alpha Pi, engineering technology; Pi Tau Sigma, mechanical engineering; Eta Kappa Nu, electrical and electronics engineering; Sigma Gamma Tau, aerospace engineering; and Chi Epsilon, civil engineering. A student branch of the Society of Women Engineers is also open to both male and female students enrolled in programs in the School of Engineering.

Special Admissions Criteria

The undergraduate programs in Engineering are designated as impacted programs (see earlier section of catalog on "Admissions"). In order to alleviate the pressure of impaction and to better evaluate applicants to the programs in question, a special admission policy has been adopted. Candidates interested in applying for any undergraduate degree program in the School of Engineering must do so during the month of November to be considered for the following academic year. All candidates must meet regular university admission standards as well as any additional standards required by the departments within the school. For specific admission information, interested students should contact the respective department chairs. Unless otherwise specified courses in the School of Engineering are open only to students with declared School of Engineering majors.

Departments and Majors

MASTER OF ENGINEERING
Seung P. Li, Director, Division of Engineering Graduate Studies.

AEROSPACE ENGINEERING
Rodney D. Sutherland, *Chair,* Aerospace Engineering major (BS)

CHEMICAL AND MATERIALS ENGINEERING
Edward C. Hohmann, Jr., *Chair,* Chemical Engineering major (BS); Materials Science and Engineering minor

CIVIL ENGINEERING
Robert R. Schneider, *Chair,* Civil Engineering major (BS).

Options in General Civil Engineering, and in Environmental Engineering

ELECTRICAL AND COMPUTER ENGINEERING
John P. Palmer, *Chair,* Electrical Engineering major (BS)
Options in Computer Engineering, Electrical Engineering and in Power Systems Engineering

ENGINEERING TECHNOLOGY
Samuel L. Pritchett, *Acting Chair,* Engineering Technology major (BS)
INDUSTRIAL AND MANUFACTURING ENGINEERING
--------, *Chair,* Industrial Engineering major (BS), Manufacturing Engineering major (BS)
MECHANICAL ENGINEERING
Kenneth J. Schneider, *Chair,* Mechanical Engineering major (BS)
Options in Mechanical Engineering, Energy Systems Engineering and in Petroleum Engineering
AGRICULTURAL ENGINEERING
see School of Agriculture
ENERGY ENGINEERING MINOR
John R. Biddle, *Chair,* Energy Engineering Committee
MATERIALS SCIENCE AND ENGINEERING MINOR
John L. Tomlinson, *Chair,* Materials Science and Engineering Committee
OCEAN ENGINEERING MINOR
John C. McMillan, *Chair,* Ocean Engineering Committee

Cooperative Education

Anthony L. Tilmans, *Coordinator for School of Engineering*

Department Coordinators:

Rodney D. Sutherland, *Chair,* Aerospace Engineering
Edward C. Hohmann, *Chair,* Chemical and Materials Engineering
Ray Morales, *Professor,* Civil Engineering
Mohamed Rafiquzzaman, *Professor,* Electrical and Computer Engineering
Samuel L. Pritchett, *Acting Chair and Professor,* Engineering Technology
Joseph P. Wymer, *Professor,* Industrial and Manufacturing Engineering
Leonard Berkowitz, *Professor,* Mechanical Engineering

The School of Engineering commenced a cooperative education program with industry during the fall quarter, 1977. This program is designed to provide alternating periods of full-time study and full-time work. It is expected that each student on the co-op program will spend a total of four quarters over a three-year period in the work experience. For this four quarters of experience the student may receive 16 units of academic credit, which may satisfy elective units and specific departmental requirements.

Students on the co-op program should benefit in at least four major ways:

1. Provide the opportunity for the student to have the "real world responsibility and experience" in business and engineering. This experience should stimulate the student to pursue with excitement those areas of academic instruction that relate to the newly acquired experience.
2. Provide the opportunity for the student to evaluate alternate career opportunities.
3. Provide an opportunity for students to earn a good salary which will enable them to go to school full-time during alternating periods.
4. Provide an opportunity for prospective employers to get acquainted with co-op students.

More information may be obtained from the Dean of Engineering's office and/or the University's career planning and placement center.

The curriculum for the co-op program is located in the following "Courses in Related Engineering" section of the catalog.

Courses in Related Engineering

EGR 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

EGR 201 Role of Engineering in Society (3)

A study of the development of technology, explosion of knowledge in the scientific fields; impact on culture, education and economics; automation; current developments in industry and technology. For non-engineering majors and as free elective credit for engineering majors. 3 lectures.

EGR 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of instructor. Instruction is by lecture, laboratory, or a combination of both.

EGR 401 Products Liability and Patents (4)

Products liability: bases of recovery in legal theory, incurrence of liability, problems of defense and proof. Patents: types of patents, basic legal requirements to obtain patents, benefits and problem areas. Engineering (professional) liability: theory differentiation from products liability. 4 lectures. Prerequisite: Senior standing or consent of instructor.

EGR/SCI 460 Problems in Oceanographic Studies (3–5)

Course offered in conjunction with the Southern California Ocean Studies Consortium (SCOSC). Topics vary each term. See Ocean Engineering minor coordinator in School of Engineering for further information. Upper division standing and permission of instructor required.

EGR 470, 471, 472, 473 Cooperative Education (4 each)

Four quarters of full-time industry work experience of a nature that relates academic engineering theory to practice. Prerequisite: Junior standing and approval of engineering co-op coordinator.

EGR 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory or a combination of both.

General Education

The School of Engineering has a program-by-program approved deviation from the university-wide established General Education program requirement. Since General Education approved coursework is subject to constant university review, specific courses listed to meet General Education requirements may have changed or have been altered subsequent to the publication of this catalog. Students should therefore consult with their major department for the specific General Education pattern approved for their major and for up-to-date course listings.

AEROSPACE ENGINEERING

Rodney D. Sutherland, *Chair*

Donald C. Curran — George R. Graves — William E. Mortensen

Robert F. Davey — Paul A. Lord — Conrad F. Newberry

Traditionally the aerospace engineer has been involved with the design and development of high speed vehicles such as aircraft, missiles and spacecraft. In recent years this list has evolved to include ocean vessels and high speed land vehicles. The extreme environments in which the above class of vehicles operate have dictated the construction of the most complex engineering systems devised by man. The aerospace engineer is confronted with problems which cannot be defined fully and require imaginative and sophisticated solutions.

The department offers a major in aerospace engineering. The major provides a broad background in the humanities and social sciences, mathematics, basic science, engineering science, analysis, design and systems. The basic concepts taught in the above areas are illustrated and reinforced by applications taken from current industrial practice. The advanced engineering (applied mechanics, computer applications, systems analysis, etc.) which has been pioneered by the aerospace industry is a mainstay of the program. Facilities available for experimental studies include subsonic and supersonic wind tunnels, environment simulation equipment, flight structures laboratory, and an aerospace construction laboratory.

Graduates of the program are prepared to do productive work in their first job as well as to grow with their profession throughout their engineering career. The curriculum is designed to prepare a student for direct entry into the engineering profession and for graduate school. The aerospace engineering curriculum is accredited by the Accreditation Board for Engineering and Technology.

Aerospace engineering students have the opportunity to join the student branch of the American Institute of Aeronautics and Astronautics, a national society organized for the advancement of aerospace knowledge. Qualified students also have the opportunity to join the student branch of Sigma Gamma Tau, the aerospace engineering national honor society.

CORE COURSES FOR MAJOR

(Required of all students)

Aerospace Engr Fund	ARO	124	(2)
Aerospace Engr Fund	ARO	125	(2)
Aerospace Engr Fund	ARO	126	(2)
Systems Engineering	ARO	245	(2)
Experimentation Systems	ARO	246	(2)
Vector Fluid Dynamics	ARO	301	(4)
Subsonic Aerodynamics	ARO	305	(4)
Gas Dynamics	ARO	311	(4)
Propulsion Systems	ARO	312	(4)
Intro to Structural Mech	ARO	326	(4)
Aerospace Structural Mech	ARO	327	(4)
Energy, Mass & Moment Trans	ARO	401	(4)
Supersonic Aerodynamics	ARO	404	(4)
Aerovehicle Stab & Control	ARO	405	(4)
Dynamics of Aerospace Systems	ARO	406	(4)
Advanced Aerospace Analysis	ARO	444	(3)
Advanced Aerospace Analysis	ARO	445	(3)
Adv. Aerospace Design Proj	ARO	446	(2)
Senior Project	ARO	461	(2)
Senior Project	ARO	462	(2)
Undergrad Seminar	ARO	463	(2)
Vector Statics	ME	214	(3)
†Approved Electives			(16)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Undergrad Seminar	ARO	463	(2)
Life Science	BIO	110	(3)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Lab	CHM	151	(1)
General Chemistry Lab	CHM	152	(1)
Principles of Economics	EC	201	(4)
or Principles of Economics	EC	202	(4)
Elements of Elec Engr	ECE	231	(4)
Elec Instru & Control	ECE	333	(4)
Analog Comp Lab	ECE	338	(1)
Freshman Composition	ENG	104	(4)
Freshman Composition	ENG	105	(4)
Engineering Economy	IE	405	(3)
Descriptive Geometry	MFE	125	(2)
or Comp Aided Drafting	MFE	210	
Analytical Geom & Calc	MAT	114	(3)
Analytical Geom & Calc	MAT	115	(3)
Analytical Geom & Calc	MAT	116	(4)
Calc of Several Variables	MAT	214	(4)
Cal of Several Variables	MAT	215	(4)
Differential Equations	MAT	316	(4)
Laplace Trans & Fourier Ser	MAT	317	(3)
Math Analysis of Engr Prob	MAT	318	(3)
Vector Dynamics	ME	215	(4)
Thermodynamics	ME	301	(4)
Materials Science	MTE	207	(3)
General Physics	PHY	131	(3)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Physics Lab	PHY	151	(1)
General Physics Lab	PHY	152	(1)
General Physics Lab	PHY	153	(1)
General Psychology	PSY	201	(4)
Basic Science Elective			(3)
Additional units to complete General Education Catagory III (8) and IV (4) (†)			(12)

†To be selected with the approval of advisor.

Course Descriptions

ARO 124 Aerospace Engineering Fundamentals (2)

Application of basic engineering fundamentals to aerospace problems. Concepts of fluid flow. Instrumentation and operation of the subsonic wind tunnel. 2 three-hour laboratories. Prerequisite: High school chemistry or physics, concurrent with MAT 114.

ARO 125 Aerospace Engineering Fundamentals (2)

The atmosphere, Archimedes' principle, properties of real fluids, viscosity, Reynolds' number, Stokes' law, laminar and turbulent boundary layers, effect of streamlining, momentum principle. 2 three-hour laboratories. Prerequisite: ARO 124, or consent of instructor.

ARO 126 Aerospace Engineering Fundamentals (2)

Introduction to digital computation. Flow charting, computational error analysis, data evaluation and presentation. Solution of problems generated from the aerospace sciences. 1 lecture. 1 three-hour laboratory. Prerequisite: MAT 114.

ARO 245 Systems Engineering (2)

Matrix algebra. State-space concepts. Optimization. Linear programming; simplex method, duality. Transportation, transshipment, assignment problems. Integer programming. Network analysis; PERT, CPM. Computer simulation. Two lectures. Prerequisites: ARO 244, MAT 214.

ARO 246 Experimentation Systems (2)

Planning of experiments, error analysis, checking and rejection of test data. Data analysis by statistical and numerical methods. Applications from the aerospace sciences. 2 three-hour laboratories. Prerequisite: ARO 245, PHY 133.

ARO 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ARO 301 Vector Fluid Dynamics (4)

Properties of the continuum. Control volume and control surface concepts. Inertial and noninertial systems. Potential flow theory. Development and application of the Navier-Stokes equations. Boundary layer theory. 4 lectures. Prerequisite: MAT 214, 215, 318.

ARO 305 Subsonic Aerodynamics (4)

Airfoil and wing geometry. Chordwise and spanwise wing loading. Pressure, induced skin friction drag. Drag polars. Blade element theory. Performance; steady flight, accelerated flight, take-off and landing. V-n diagram. 4 lectures. Prerequisite: ARO 301.

ARO 311 Gas Dynamics (4)

Thermodynamic processes. One-dimensional compressible flow. Area change, friction, heat addition. Normal and oblique shock waves. Nozzle and diffuser theory. Gas dynamics laboratory. 3 lectures, 1 three-hour laboratory. Prerequisites: ARO 301, ME 301.

ARO 312 Propulsion Systems (4)

Systems analysis of the fuel burning performance of aircraft and missile power plants. Aerothermodynamics of inlets, combustors and nozzles. Cycle analysis. Turbomachines. Emphasis on turboprop, turbojet, ramjet and liquid and solid rockets. 4 lectures. Prerequisite: ARO 311.

ARO 326 Introduction to Structural Mechanics (4)

Engineering material properties, elasticity, plasticity, environmental effects, stress and strain. Uniaxial stress and deflection. Two-dimensional states of stress and strain. Torsional shear stress and deformation. Beam shear and moment diagrams, stresses and deflections. 4 lectures. Prerequisites: ME 214, MAT 215.

ARO 327 Aerospace Structural Mechanics (4)

Analysis of composite beams and statically indeterminate beams. Energy methods for indeterminate structures. Column and instability theory. Experimental stress analysis, strain gauges and photoelasticity. Introduction to analysis of flange-web structures. 3 lectures, 1 three-hour laboratory. Prerequisites: ARO 326.

ARO 328 Aerospace Structure (4)

Aerospace structural analysis in the design process. Semi-monocoque structures. Joints and connections. Designing for structural integrity, fracture and fatigue considerations. 4 lectures. Prerequisite: ARO 327.

ARO 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ARO 401 Energy, Mass and Momentum Transfer (4)

Kinetic theory. Transport properties. Transfer of momentum and energy in laminar and turbulent boundary layers. Energy transfer in high velocity, rarefied and dissociated flows. Energy transfer by conduction, convection and radiation. Mass transfer, molecular diffusion. 4 lectures. Prerequisite: ARO 301.

ARO 402 Numerical Methods (4)

Numerical methods in engineering. Algorithms. Interpolating polynomials, difference formulas, numerical differentiation and integration. Matrix methods. Non-linear systems. Solution of differential equations. CSMP. Applications to engineering problems. 4 lectures. Prerequisites: ARO 126 or equivalent, MAT 216.

ARO 404 Supersonic Aerodynamics (4)

Effects of compressibility; two-dimensional and conical supersonic flow fields; similarity concepts; solution of wave equations; shock expansion theory. 4 lectures. Prerequisite: ARO 311 or consent of instructor.

ARO 405 Aerospace Vehicle Stability and Control (4)

Static longitudinal stability and control; stick-fixed, stick-free. Maneuvering flight; stick force, c.g. travel. Directional stability; rudder fixed, rudder free, rudder power. Lateral stability; dihedral effect, damping. Dynamic stability; longitudinal, lateral, directional. Transfer functions. 4 lectures. Prerequisite: ARO 305, 404, 406.

ARO 406 Dynamics of Aerospace Systems (4)

Three-dimensional vector dynamics of aerospace systems; linear and angular momentum; Lagrangian dynamics; method of Euler; introduction to space vehicle motion. 4 lectures. Prerequisites: ME 215, MAT 318.

ARO 407 Flight Dynamics (4)

Three dimensional rigid body motion methods of Newton and Lagrange. Euler transformations. Performance analysis of aircraft, missiles and spacecraft. 4 lectures. Prerequisites: ARO 305, 406, MAT 317.

ARO 408 Introductory Finite Element Structures (4)

Matrix operations. Stiffness and flexibility. Finite element properties. Stiffness method. Computer applications. Structural dynamics. 4 lectures. Prerequisite: ARO 327.

ARO 409 Astrodynamics (4)

Kepler's laws of motion and satellite orbits, orbital transfers. Space vehicle motion, de-spinning of satellites. Performance and optimization of single and multistage rocket. 4 lectures. Prerequisite: ARO 407.

ARO 410 Hydronautics (4)

Statics and dynamics of ocean-surface craft and submersible craft. Propeller and cavitation theory. Hydrofoils, drag reduction. Underwater propulsion systems. Wave mechanics; forces on fixed structures. 4 lectures. Prerequisite: Fluid dynamics course or consent of instructor.

ARO 411 Hydrospace Laboratory (2)

Wave measurement. Wave induced forces and motions. Wave-making resistance. Forces on displacement vehicles. Hydrofoil performance. Structure performance in a deep sea environment. Forced harbor oscillations. 1 lecture, 1 three-hour laboratory. Prerequisites: ARO 410, EEE 333.

ARO 412 Basic Wing Theory (4)

Potential flow theory. Complex mappings. Chordwise pressure distributions; Kutta-Joukowski transformation, thin airfoil theory. Sectional force and moment coefficients. Symmetric and asymmetric spanwise loading; basic and additional life effects. Twist. Wing force and moment coefficients. High lift devices. 4 lectures. Prerequisite: ARO 305.

ARO 415 Off-Shore Structures (4)

The off-shore ocean environment. Seaway structural loadings. Off-shore structural materials. Line structures. Work ship structures. Off-shore drilling and production platforms. Mooring terminals. Salvage and emplacement operations. 4 lectures. Prerequisite: A course in strength of materials or structural mechanics.

ARO 416 Pressure Vessel Design (4)

Practical design of pressure vessels for external and internal pressure. Engineering practices necessary to complete designs and test pressure vessels. Case histories covered in detail as examples for the practicing engineer. 3 lectures, 1 recitation. Prerequisites: ARO 326, ME 318, or equivalent.

ARO 418 Atmospheric Pollution Control (4)

Application of engineering concepts to atmospheric pollution problems. Reaction kinetics. Diffusion. Atmospheric emissions; particulate, gaseous. Atmospheric boundary layer. Plume rise. Combustion; flame structure,

droplet burning. Photochemical smog. Control concepts. 4 lectures. Prerequisites: Thermodynamics and fluid dynamics courses or consent of instructor.

ARO 426 Aerospace Surface Systems (4)

Aerospace fundamentals of high speed surface systems. Station-to-station concepts. Air cushion and tubeflight systems. Airload determination. Drag reduction. Propulsion systems and braking. Guideway considerations. Stability and control. 4 lectures. Prerequisite: Fluid dynamics course or consent of instructor.

ARO 427 Aeroacoustical Noise (4)

Scales and units of noise measurement. Sources and characteristics of aircraft noise. Traffic and vehicular noise. Airport noise. Noise abatement; aircraft, road vehicles, airports, highways. Sonic boom effects. 4 lectures. Prerequisite: Thermodynamics course or consent of instructor.

ARO 431 Intermediate Finite Element Structures (4)

Structural dynamics, structural stability and advanced elements in the finite element method. Basic theory will be augmented strongly by computer programming and computations. Group effort on the actual construction of programs. Use of standard, prepared programs. 4 lectures. Prerequisite: ARO 408 or equivalent introduction to finite element or matrix-computer methods.

ARO 435 Experimental Techniques in Aerodynamics (2)

Test plan formulation. Pressure, temperature and force measurement. Test section calibration and correction. Subsonic and supersonic wind tunnel applications. 2 three-hour laboratories. Prerequisites: ARO 305, 311 or consent of instructor.

ARO 444 Advanced Aerospace Analysis (3)

Formulation of mathematical models for physical phenomena by vector, matrix and tensor methods. Coordinate systems and transformations. Free body methods. Virtual displacement techniques applied to steady state systems. 2 lectures, 1 three-hour laboratory. Prerequisites: ARO 327, 404. Concurrent: ARO 406.

ARO 445 Advanced Aerospace Analysis (3)

Formulation of mathematical models for unsteady state phenomena occurring in aerospace engineering. Optimization and parametric studies of typical aerospace systems. 2 lectures, 1 three-hour laboratory. Prerequisite: ARO 444.

ARO 446 Advanced Aerospace Design Project (2)

Preliminary design of aerospace systems. System analysis. Design optimization. Design compromise in multidisciplined systems. Verbal and written presentation of system design. 2 three-hour laboratories. Prerequisites: ARO 305, 404, 445.

ARO 461, 462 Senior Project (2) (2)

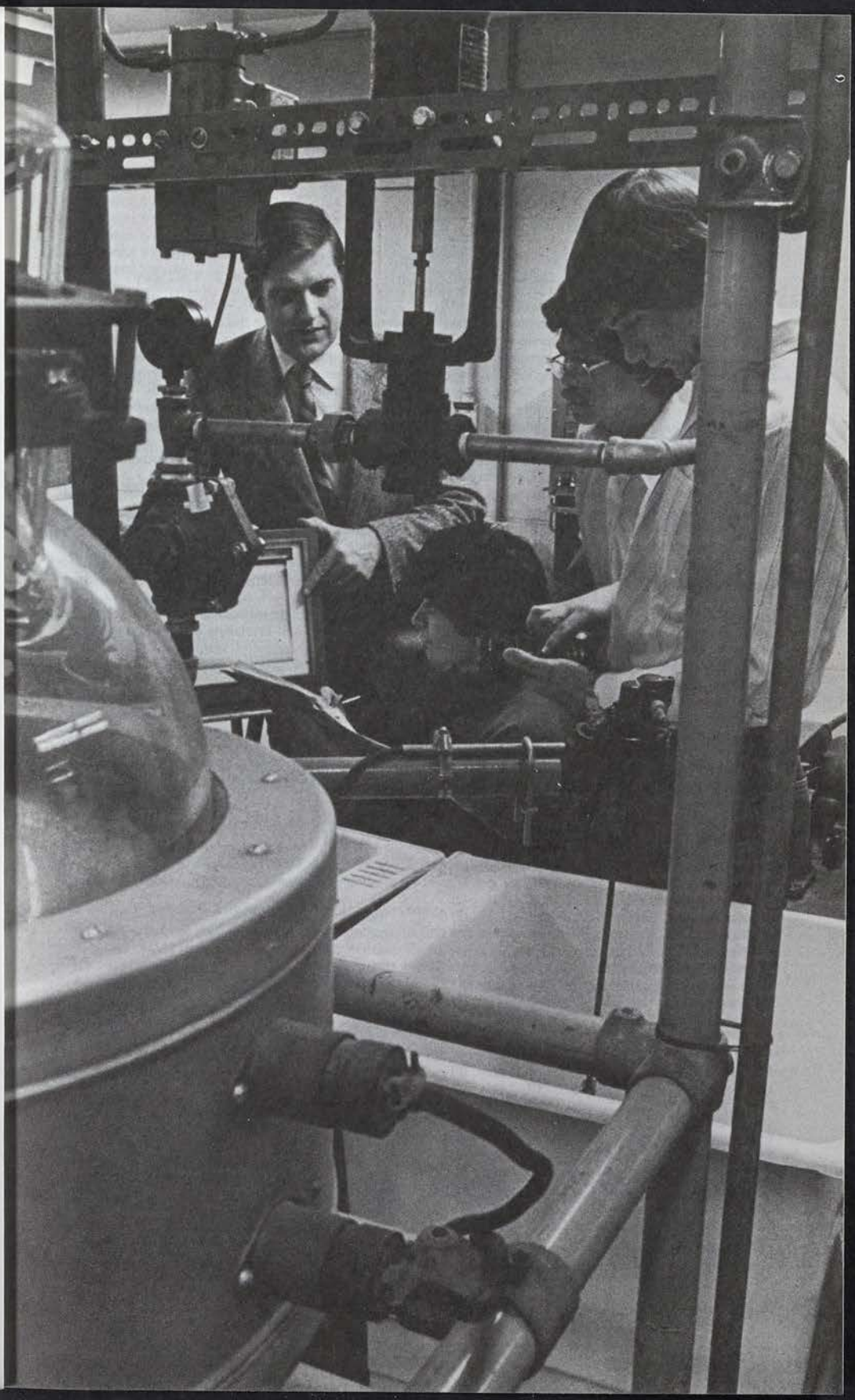
Selection and completion of a project under faculty supervision. Projects typical problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Concurrent: ARO 444, or consent of instructor.

ARO 463 Undergraduate Seminar (2)

Preparation, oral presentation, and discussion by students of recent engineering developments. 2 lectures. Prerequisite: Senior standing.

ARO 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: consent of instructor. Instruction is by lecture, laboratory, or a combination of both.



CHEMICAL AND MATERIALS ENGINEERING

Edward C. Hohmann, Jr., *Chair*

C. James Barr
Robert S. Bray
Robert G. Feeney
William M. Harris
Thuan K. Nguyen
Garland E. Scott, Jr.
Henry P. Sheng
A. George Stoll
Joseph P. Tassoney
John L. Tomlinson

Chemical engineering is the branch of professional engineering which embraces the development and application of industrial processes and materials in which chemical and physical changes of material are involved. These changes are accomplished in a competitive economy to create products which are useful and essential to the modern world. Chemical engineering includes the design, development, and production of many products such as fuels and petrochemicals, plastics, fibers, paper, foods, building materials and pharmaceuticals.

The program blends the basic sciences with engineering disciplines to focus upon the design, development and engineering of industrial processes and plants. Students are well prepared upon graduation to begin either their professional career or a program of graduate study.

The Accreditation Board for Engineering and Technology accredited the curriculum which provides courses leading to the B.S. degree with a major in chemical engineering.

The chemical engineering curriculum includes basic courses in chemistry, physics, mathematics, electrical, industrial, and mechanical engineering. In addition, coursework in the major includes a modern treatment of transport phenomena, unit operations and processes, thermodynamics, kinetics, design, engineering; industrial materials, and economics. A senior research program enables students to develop essential planning, experimenting and reporting skills in a subject of their choice. Extensive laboratory and computerized test facilities exist for process and materials investigations, as well as complete pilot plant scale equipment for extended development and confirmatory studies. Optional industry work programs are available.

Courses in materials engineering are offered by the department. These include studies in properties and behavior of engineering materials. Emphasis is placed on the atomic, molecular, and crystalline structure, the physical properties of solids, thermodynamic properties of materials, transport phenomena, reactions, and mechanical behavior. Problems in the preparation, properties, applications of ceramics, polymers, metals, and alloys are considered in light of scientific and engineering principles. The department laboratories include facilities for metallography, heat treating, mechanical properties testing, materials joining, semiconductor crystal growing, and non-destructive testing.

Students planning to enter the chemical engineering curriculum should take the maximum number of courses in mathematics, chemistry and physics.

Transfer students who have completed appropriate junior college programs may expect to receive their B.S. degree in chemical engineering in six quarters at Cal Poly when entering in the Fall quarter.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Chem Engr	CHE	131	(1)
Computer Programming	CHE	132	(2)
Chemical Engr Data Treatment	CHE	133	(2)
Stoichiometry I	CHE	201	(3)
Stoichiometry II	CHE	202	(3)
Chem Engr Thermodynamics I	CHE	302	(4)
Chem Engr Thermodynamics II	CHE	303	(4)
Kinetics and Reactor Design	CHE	304	(4)
Momentum Transport	CHE	311	(4)
Energy Transport	CHE	312	(4)
Mass Transport	CHE	313	(4)
Process Modeling & Analysis	CHE	415	(4)
Unit Operations I	CHE	425	(4)
Process Control	CHE	426	(4)
Unit Operations II	CHE	427	(4)
Chemical Processes	CHE	441	(4)
Chemical Process Synthesis & Design I	CHE	442	(4)
Chemical Process Synthesis & Design II	CHE	443	(4)
Senior Project	CHE	461	(2)
Senior Project	CHE	462	(2)
Undergrad Seminar	CHE	463	(2)

SUPPORT & ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Undergrad. Seminar	CHE	463	(2)
Life Science	BIO	110	(3)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry	CHM	113	(3)
General Chemistry Lab	CHM	151	(1)
General Chemistry Lab	CHM	152	(1)
Organic Chemistry	CHM	314	(3)
Organic Chemistry	CHM	315	(3)
Organic Chemistry	CHM	316	(3)
Organic Chemistry Lab	CHM	317	(1)
Physical Chemistry	CHM	311	(4)
Physical Chemistry	CHM	312	(3)
Physical Chemistry	CHM	313	(3)
Pollution Abatement	CHE	343	(4)
Technical Writing	COM	219	(4)
Principles of Economics	EC	201	(4)
or Prin of Econ	EC	202	

Elements of Elec Engr	ECE	231	(4)
Elec Instr & Control	ECE	333	(4)
Freshman Composition	ENG	104	(4)
Engineering Economy	IE	405	(3)
Analytic Geom & Calculus	MAT	114	(3)
Analytic Geom & Calculus	MAT	115	(3)
Analytic Geom & Calculus	MAT	116	(4)
Calc of Several Variables	MAT	214	(4)
Calc of Several Variables	MAT	215	(4)
Diff Equations	MAT	216	(4)
or	MAT	316	(4)
Vector Statics	ME	214	(3)
Strength of Materials	ME	218	(3)
Materials Sci & Engr	MTE	207	(3)
Materials Sci & Engr Lab	MTE	217	(1)
General Physics	PHY	131	(3)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Physics Lab	PHY	151	(1)
General Physics Lab	PHY	152	(1)
General Pbysics Lab	PHY	153	(1)
General Psychology	PSY	201	(4)
Courses to Complete General Education [Catagory III (8) and IV (4), (select with consent of advisor]			(12)

Course Descriptions

CHE 131 Introduction to Chemical Engineering (1)

Freshman chemical engineering introductory seminar, with topics in other disciplines. Laboratory activity in physical property measurement. Emphasis on report writing. 1 three-hour laboratory.

CHE 132 Computer Programming (2)

Introduction to analog and digital computers (mini, batch and timesharing systems). FORTRAN and BASIC programming for digital computers. The use of computers in solving chemical engineering problems. 1 lecture, 1 three-hour computational laboratory.

CHE 133 Chemical Engineering Data Treatment (2)

Statistical methods in the planning and analysis of chemical engineering experimentation. Typical chemical process operations are studied. Numeric computation heavily dependent on computer methods. 1 lecture, 1 three-hour computational laboratory. Prerequisite: CHE 132.

CHE 201, 202 Stoichiometry I (3), II (3)

Material and energy balances for physical and chemical processes. Equilibrium stage concept, process flow diagrams and process simulators for plant mass and energy balance calculations. Practice in report writing and oral presentation of chemical process concepts. 2 lectures, 1 three-hour computational laboratory. Prerequisites: CHE 133, CHM 113.

CHE 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

CHE 302 Chemical Engineering Thermodynamics I (4)

The first and second laws of thermodynamics with applications to industrial chemical processes. The phase rule, P-V-T relations of fluids, ideal and non-ideal gases. Enthalpy changes in reaction, mixing and phase transition. The calculation of thermodynamic properties from laboratory data. 4 lectures. Prerequisite: MAT 216.

CHE 303 Chemical Engineering Thermodynamics II (4)

Thermodynamics of flow processes. Applications of the first and second laws to heat engines and heat pumps. Refrigeration cycles, including absorption and the Joule-Thompson effect. Thermodynamic analyses of processes. Phase equilibria of ideal and non-ideal systems. The Gibbs-Duhem equation and concept of fugacity, activity, and activity coefficient. Chemical reaction equilibria. 4 lectures. Prerequisite: CHE 302.

CHE 304 Kinetics and Reactor Design (4)

Chemical reaction kinetics of homogeneous and heterogeneous systems. Analysis of kinetic data. Applications to process reactor design and operation. 4 lectures. Prerequisite: CHE 303, CHE 312.

CHE 311 Momentum Transport (4)

Basic course in fluid mechanics with emphasis on real fluids and applications to unit operations of chemical engineering, including topics in dimensional analysis, fluid properties, kinematics, and dynamics of fluid flow, friction, boundary conditions, classic flows, and turbulence. 4 lectures. Prerequisite: MAT 216.

CHE 312 Energy Transport (4)

Heat transfer with application to the unit operations of chemical engineering, including topics in energy transfer by conduction, convection and radiation. 3 lectures. 1 three-hour laboratory. Prerequisite: CHE 311.

CHE 313 Mass Transport (4)

Mass transfer and its application to the unit operations of chemical engineering, including topics in molecular diffusion, convective diffusion, simultaneous heat and mass transfer, distillation and extraction. 3 lectures, 1

three-hour laboratory. Prerequisite: CHE 312.

CHE 380 Chemical Applications to Petroleum Engineering (4)

Introduction to P-V-T relations, phase equilibrium, and laws of solutions. An analysis of organic fluids used in drilling, production, and storage operations and petroleum applications of organic substances. 4 lectures. Prerequisites: CHM 111, 112 and ME 101. Not open to CHE majors.

CHE 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

CHE 415 Process Modeling and Analysis (4)

Mathematical modeling of physical and chemical processes. Analytical and numerical solutions for steady and unsteady state problems. 4 lectures. Prerequisites: CHE 304, 313.

CHE 425 Unit Operations I (4)

An extended treatment of mass, momentum and heat transport viewed with the traditional unit operations emphasis. Multicomponent and multiphased operations are considered. 3 lectures and 1 three-hour laboratory. Prerequisites: CHE 304, 313.

CHE 426 Process Control (4)

Introduction to theory and application of automatic control to chemical processes. 3 lectures, 1 three-hour laboratory. Prerequisites: CHE 415, 425.

CHE 427 Unit Operations II (4)

A continuation of the unit operations approach to mass, momentum and heat transport with emphasis on the dynamics of these operations. 3 lectures and 1 three-hour laboratory. Prerequisite: CHE 426.

CHE 432 Pollution Abatement (4)

Identification and development of solutions to problems created in the human environment by modern industry. Categorization and analysis of major influences imposed on the environment by industrial plants, by application of principles, equipment and techniques of chemical engineering. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 213 and senior standing in engineering courses.

CHE 441 Chemical Processes (4)

Integration of unit processes, unit operations into the overall industrial chemical process. On-site study of selected process industries. 3 lectures and 1 three-hour laboratory. Prerequisite: CHE 304, 313, CHM 316, 313, physical and organic chemistry requirements.

CHE 442 Chemical Process Synthesis and Design I (4)

Integration of unit processes, unit operations and their economics in the synthesis of the total chemical process and plant. Analysis of the major chemical industries; study of the synthesis of their processes. 2 lectures. 2 three-hour computational laboratories. Prerequisites: CHE 415, 441.

CHE 443 Chemical Process Synthesis and Design II (4)

Economic and engineering principles guiding the selection of chemical processes, design of optimum flows and equipment, design of process operations and a plant. 2 lectures, 2 three-hour computational laboratories. Prerequisite: CHE 442.

CHE 461, 462 Senior Project (2) (2)

Formal encounter with a professional assignment, simulating the graduate chemical engineer at work, and culminating in a final engineering report. Prerequisites: CHE 304, 313.

CHE 463 Undergraduate Seminar (2)

Research on, and presentation of, recent developments in chemical engineering. 2 lectures. Prerequisite: CHE 461.

CHE 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

Materials Engineering

MTE 207 Materials Science and Engineering (3)

Concepts of materials science and the atomic, molecular, and crystalline structures and properties of materials with their relevance to engineering. Mechanical, electrical, thermal, and chemical properties of metals, ceramics,

polymers, composites, and semiconductors are covered. 3 lectures. Prerequisites: CHM 112, PHY 131 and MAT 116.

MTE 217 Materials Science and Engineering Laboratory (1)

Laboratory to accompany MTE 207. Crystallography, mechanical properties, annealing, heat treatment and environmental influences on materials. 1 three-hour laboratory period. Concurrent: MTE 207.

MTE 251 Fundamentals of Art Welding (3)

Fundamentals of welding processes. Emphasis on skills and techniques required to develop competency to visualize the potentials and limitations in self-expression in the media of metals. 2 lectures, 1 three-hour laboratory.

MTE 337 Welding Fabrication and Design (3)

Introduction to welding design, including properties and geometry of welded joints. Consideration of thermal effects and previous processing. Application of selected welding processes. Automation related to design. Evaluation methods. Cost factors. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 214, MTE 207 or ME 315.

MTE 351 Welding Laboratory (2)

Welding laboratory for the creation of special projects. Designed for students who are not intensely interested in welding per se, but desire to use welding as a means to obtain their own particular ends—art, research, invention, etc. Emphasis on individual development and creativity. 2 three-hour laboratories. Prerequisite: MTE 251, or consent of instructor.

MTE 404 Advanced Science of Materials (3)

Advanced concepts of Materials Science and their relevance to engineering. Origin of electronic, thermal, magnetic and optical properties. Structural characteristics of metals, semiconductors and dielectrics. Use of x-ray and electron microscopes in materials analysis. Three lectures. Prerequisite: MTE 207 or ME 315.

MTE 405 Physical Metallurgy—Mechanical Properties (4)

Basic principles underlying the structure and properties of crystalline solids. Metallic and covalent bonding theories; crystallography; solid solutions, intermetallic compounds and alloys. Crystal imperfections, elastic and plastic deformation. Ductile and brittle fracture, fatigue and creep. 4 lectures. Prerequisite: material science course.

MTE 406 Physical Metallurgy—Solidification and Strengthening Reactions (4)

Principles of solid-state reactions including elementary kinetics, nucleation and growth theory; annealing of cold-worked metals; diffusionless transformation, precipitation reactions and tempering; physical metallurgy of steels; relation between properties and microstructure. Laboratory experiments related to phase transformations in steel and precipitation hardening. 3 lectures, 1 three-hour laboratory. Prerequisite: material science course.

MTE 407 Ceramic Materials (3)

The composition structure, and properties of ceramic bodies employed as structural and non-structural materials, with an emphasis on processing and their physical state, elasticity, strength, and optical, thermal, and electrical properties. Prerequisite: MTE 207.

MTE 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

CIVIL ENGINEERING

Robert R. Schneider, *Chair*

Jerome N. Borowick
Donald E. Breyer
Ronald L. Carlyle
Peter J. Clark
Frank Janger
Donald W. King
Ray Morales
Claude B. Ogle
Blaine Vogen
Donald G. Wells

The civil engineering program prepares graduates to enter the profession in design, construction, or management capacities on such projects as freeways, highways, major buildings, dams, bridges, aqueducts, pipelines, airports, hydro-electric installations, water treatment plants, sewage treatment plants, flood control works, and urban development programs. The department offers two options; the general civil engineering option and the environmental engineering option. The student earns the baccalaureate degree in civil engineering upon completion of either option. Both options are fully accredited by the Accreditation Board for Engineering and Technology.

The general civil engineering option is selected by students desiring a broad background in the various aspects of the civil engineering profession. The environmental engineering option provides the student with a background in the acquisition and uses of water and the ability to solve environmental pollution problems caused by gaseous, liquid and solid wastes.

Graduates are employed by governmental agencies at federal, state, and municipal levels and by engineering contractors and private consulting firms. Other areas of employment are sales engineering, teaching, research, materials testing, city planning, and administrative fields.

Student projects and field trips are utilized to demonstrate practical applications of classroom and laboratory theory and analysis concepts. Interactions with professional engineering technical groups and societies offer excellent opportunities for student contact with experienced, practicing engineers.

CORE COURSES FOR MAJOR

(Required of all students)

Intro. to Civil Engineering	CE	122	(2)
Elem. Surveying	CE	134	(4)
Computers in Civil Engineering	CE	210	(2)
Structural Analysis I	CE	304	(3)
Structural Analysis II	CE	305	(3)
Soil Mechanics	CE	323	(3)
Hydraulic Engineering	CE	332	(4)
Engr. Law, Contracts and Spec.	CE	403	(3)
Structural Design—Steel	CE	406	(4)
Struc. Design Rein. Conc.	CE	421	(5)
Foundation Engineering	CE	424	(3)
Water Supply Engineering	CE	431	(4)
Water Quality Engineering	CE	432	(4)
Senior Project	CE	461	(2)
Senior Project	CE	462	(2)
Undergraduate Seminar	CE	463	(2)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Strength of Materials	ME	218	(3)
Strength of Materials	ME	219	(3)
Fluid Mechanics	ME	311	(3)

OPTION COURSES FOR MAJOR

(Required for specific option)

GENERAL CIVIL ENGINEERING

Advanced Surveying	CE	135	(4)
Transportation Engr	CE	221	(4)
Highway Engr Design	CE	222	(4)
Struc Design: Timber	CE	433	(3)
Engineering Materials	ME	315	(3)
**Technical Electives in Civil Engineering			(8)

ENVIRONMENTAL ENGINEERING

Aquatic Ecology	BIO	305	(4)
Air Pollution Problems	BIO	460	(3)
Env Resource Syst	CE	351	(4)
Indus & Radioactive Wastes	CE	434	(3)
Engineering Hydrology	CE	451	(4)
Coastal Engineering	CE	455	(4)
Solid Waste Mgmt	CE	457	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Theory of Architecture and Urbanism	ARC	451	(4)
Technological Economics	CE	301	(4)
Effective Tech Communications	CE	361	(4)
or Adv. Prof. Writing	ENG	301	(4)
Numerical Methods in Civil Engr	CE	450	(4)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Lab	CHM	151	(1)
General Chemistry Lab	CHM	152	(1)
Principles of Economics	EC	201	(4)
or Principles of Econ	EC	202	
Applied Electrical Engineering	ECE	232	(4)
Freshman Composition	ENG	104	(4)
Geotechnology	ESC	321	(4)
Engineering Design Graphics	MFE	121	(2)
Anal Geom & Calculus	MAT	114	(3)
Anal Geom & Calculus	MAT	115	(3)
Anal Geom & Calculus	MAT	116	(4)
Calc of Several Variables	MAT	214	(4)
Applied Differential Equations	MAT	316	(4)
Thermodynamics	ME	301	(4)
Upper Division Math Elective			(3)
General Physics	PHY	131	(3)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Physics Lab	PHY	151	(1)

General Physics Lab	PHY	152	(1)
General Physics Lab	PHY	153	(1)
General Psychology	PSY	201	(4)
Life Science Elective			(3)
Arts, Lit. or Phil. Electives			(8)
Human, Social, Political or Economics Elective			(4)

** 300 or 400 level courses in Civil Engr. Dept.

Course Descriptions

CE 122 Introduction to Civil Engineering (2)

Fundamental concepts of civil engineering. The technical, professional, and social responsibilities of the civil engineer. Elementary digital computer programming in basic for civil engineering problems. 1 lecture, 1 three-hour laboratory.

CE 134 Elementary Surveying (4)

Use and care of surveying instruments, fundamental surveying methods, traverse measurements, area computations, precise equipment and topographic mapping. 2 lectures, 2 three-hour laboratories. Prerequisite: MAT 104 or equivalent.

CE 135 Advanced Surveying (4)

Astronomical observations. Theory of hydrographic, geodetic and control surveys. City and land surveys. Route location and layout. Simple, transition and vertical curves. Earthwork computations. Introduction to electronic and photogrammetric methods. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 122, 134.

CE 210 Computers in Civil Engineering (2)

Application and use of computers in the Civil Engineering profession, including legal and ethical questions of widespread computer use. Advanced digital computer programming (FORTRAN language). 1 lecture, 1 three-hour laboratory.

CE 221 Transportation Engineering (4)

History and operation of several principal modes of transportation. The principal modes include highways, air, inland waterways, railroads, coastwise shipping and ocean transportation. Emphasis is placed on the financing and planning aspects of transportation. Special modes are also developed. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 135 or consent of instructor.

CE 222 Highway Engineering Design (4)

Geometric design of highways; highway sub-structure design; roadway structural section; flexible pavement design; rigid pavement design; highway surface treatments and stabilization. 2 lectures, 2 three-hour laboratories. Prerequisite: CE 221.

CE 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limit to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

CE 301 Technological Economics (4)

Principles of long-range economic analyses in a high technology era. Determining criteria for industrial economic growth considering inflation and taxation. Depreciation accounting, multiple alternatives, sensitivity analysis, retirement and replacement. Studies of investment funds, governmental activities, regulated businesses and capital budgeting. 4 lectures. Prerequisites: EC 201 or 202.

CE 304 Structural Analysis I (3)

Classification of structures, types of framing systems and loading. Statics and stability of determinate structures including cables, cantilever types, arches, beams, frames, and trusses by analytical and graphical methods. Deformation of determinate beams, frames, and trusses. Approximate methods of indeterminate frame analysis. 3 lectures. Prerequisite: ME 219.

CE 305 Structural Analysis II (3)

Types and characteristics of indeterminate beams and framed structures. Analysis utilizing classical methods including consistent displacements, virtual work, slope deflection, moment distribution. Computer solutions based upon flexibility and stiffness matrices. 3 lectures. Prerequisite: CE 304.

CE 323 Soil Mechanics (3)

Soil composition, description, and classification. Groundwater and seepage analysis. Stress analysis. Soil compaction. Stress-strain and strength properties of soils for engineering purposes. Determination of the physical properties of soils by laboratory experiments. 2 lectures, 1 three-hour laboratory. Prerequisite: ME 219.

CE 332 Hydraulic Engineering (4)

Principles of hydrostatics, hydrokinetics, and hydrodynamics. Problems involving dam analyses, flow in open channels, flow through pipes, pipe networks, pump-pipe-reservoir systems, surge tanks, water hammer, and turbines. 3 lectures, 1 three-hour laboratory. Prerequisite: ME 311.

CE 351 Environmental Resource Systems (4)

Engineered systems for optimum beneficial use and management of water resources. Technical, aesthetic, and social aspects of water quality control. Anatomy of Environmental Impact Statements, and the mechanics for preparation of environmental impact reports. 3 lectures, 1 three-hour laboratory. Prerequisites; CE 122, BIO 110, or consent of instructor.

CE 361 Effective Technical Communication (4)

Oral, visual and written technical communication required by the practicing civil engineer. Includes report writing, proposal preparation, engineering specification writing, and environmental impact reports. Prerequisite: ME 219, CE 302.

CE 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CE 403 Engineering Law, Contracts & Specifications (3)

Basic principles of law and contract documents as applied to civil engineering practices; varieties of construction contracts; relationship of owner, engineer and contractor. 3 lectures.

CE 406 Structural Design—Steel (4)

Theory and design of structural steel elements. Connection design. AISC specifications and design methods. Design of complete structural systems, including rigid frames, for both vertical and lateral loads. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 305.

CE 421 Structural Design—Reinforced Concrete (5)

Analysis, design and detailing of reinforced concrete structural components including beams, slabs and columns; with emphasis on strength design theory. Elements of integrated building design with primary emphasis on the impact of lateral forces on building stability. Introduction to working stress theory. Composition, proportioning and testing of concrete mixes. 4 lectures, 1 three-hour laboratory. Prerequisite: CE 305, 406.

CE 424 Foundation Engineering (3)

Engineering soil mechanics analysis of foundations, retaining structures, and the stability of slopes. Specific topics include: field investigations, soil consolidation, stress analysis, settlement analysis, footings, mats, raft foundations, caissons, piles retaining walls, excavation bracing, and the stability of unsupported slopes. 3 lectures. Prerequisite: CE 323, 421.

CE 427 Photogrammetry (4)

Interpretation of aerial photographs. Stereoscopy. Application of aerial surveying to engineering problems, mapping. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 134.

CE 428 Urban Transportation (3)

History, nature of problem, impact on the urban area, alternative solutions, costs of modernization, mass transit trends, the subsidy debate, role of the State and Federal governments, the nature and importance of planning. 3 lectures. Prerequisite: CE 221 or consent of instructor.

CE 429 Traffic Engineering (4)

Driver and vehicle characteristics. Origin and destination studies. Volume, speed and accident studies. Traffic control devices. Channelization design. Parking facilities design. Intersection design. Roadway lighting. Administration and financing of improvements. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 222.

CE 431 Water Supply Engineering (4)

The hydrologic cycle and its influence on the natural distribution of water. Statistical methods for determination of water demand and for enhancing flood mitigation. Ground water and stream flow determinations for the economic design of a water supply system with special emphasis on collection, reservoir management, quality control, and public distribution of water. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 332.

CE 432 Water Quality Engineering (4)

Characteristics of waste waters; analysis and treatment of sewage and industrial wastes. Basic design of waste treatment plants and sewerage systems. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 431.

CE 433 Structural Design—Timber (3)

Design load requirements. Seismic analysis. Fire resistive requirements. Design of wood structural elements including sawn lumber, glulaminated timber, and plywood. Connection design. Design of complete structural systems for both vertical and lateral loads. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 304.

CE 434 Industrial and Radioactive Wastes (3)

Source of industrial water pollutants; processes for prevention and treatment of industrial wastes. Elements of radioactive wastes and disposal methods. 2 lectures, 1 three-hour laboratory. Prerequisite: CE 432.

CE 437 Soil Strength, Slope Stability and Earth Dams (4)

Advanced soil stress-strain and strength concepts. The analysis of the stability of slopes and the desigh of stable slopes. Earth dam analysis, design and construction. 4 lectures. Prerequisite: CE 324.

CE 442 Masonry Design (4)

Properties of clay brick and concrete masonry materials. Analysis and design of reinforced masonry members, and structural systems with emphasis on lateral force analysis of masonry structures and their connections. Reinforced masonry applications in high rise construction. 4 lectures. Prerequisite: CE 421.

CE 443 Flexible Pavement Design (4)

Study of asphalt materials; design control and testing of asphaltic mixtures; asphaltic concrete mix design; road mix asphalt pavement control, design and test methods; surface treatments. 2 lectures, 2 three-hour laboratories. Prerequisite: CE 222, 323 or consent of instructor.

CE 450 Numerical Methods in Civil Engineering (4)

Numerical and statistical methods as applied to civil engineering. Numerical integration, data reduction, curve fitting, matrix methods, finite difference and finite element formulations. Emphasis on utilization of existing programs. Generation of individual programs. 4 lectures. Prerequisites: MAT 216 and CE 305.

CE 451 Engineering Hydrology (4)

Modern hydrology related to surveys on water resources for the analysis of the magnitude and frequency of floods and prediction of dependable water supplies. Hydraulics of water movement in porous materials. 3 lectures, 1 three-hour laboratory. Prerequisite: CE 431.

CE 454 Water Quality Management (3)

Engineering aspects of quality management. Technological and economic feasibility of water renovation for return to the resource pool. The economics of regional water quality management. 3 lectures. Prerequisite: CE 432.

CE 455 Coastal Engineering (4)

Linear and non-linear wave theories; effects of structures on waves; wave forces; breakwaters; harbor structures; impulsively generated waves; wind waves, measuring waves, waves in shoaling water; breakers and the surf; shores and beaches; tides; harbor oscillations and resonance; mixing processes; pollution and mining. 4 lectures. Prerequisite: CE 332 or consent of instructor.

CE 457 Solid Waste Management (4)

Solid waste treatment and disposal methods including incineration, sanitary landfill and pyrolysis. Recycling and reclamation of solid wastes. Energy from solid wastes. Treatment and disposal of wastewater sludges. 4 lectures. Prerequisite: junior standing in civil engineering or consent of instructor.

CE 461, 462 Senior Project (2) (2)

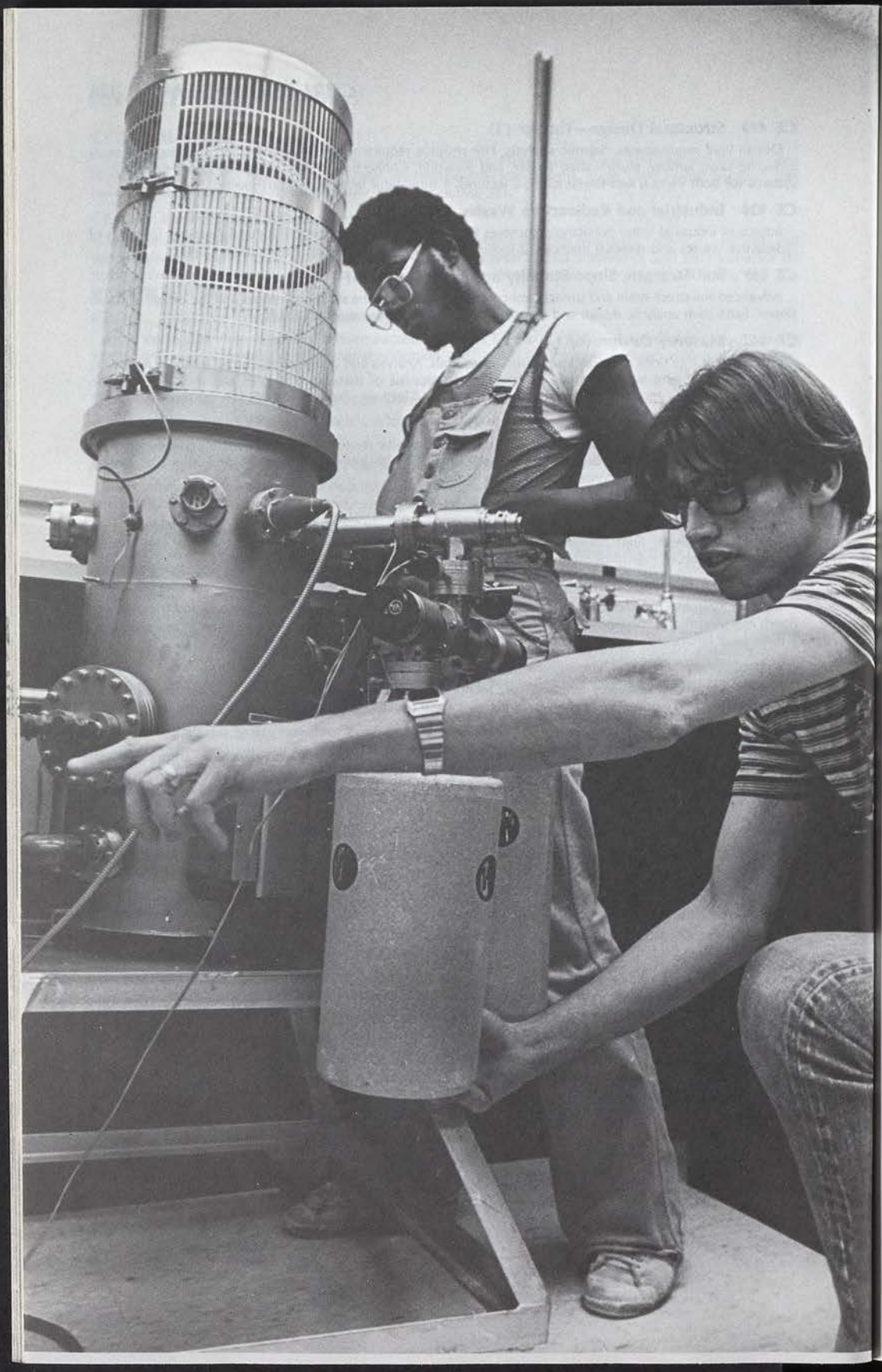
Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Presentation of project in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing; CE 361.

CE 463 Undergraduate Seminar (2)

Seminar discussions of new developments, policies, practices and procedures. Preparation and presentation by each student of an engineering development in his/her chosen field. 1 lecture, 1 three-hour laboratory on alternate weeks. Prerequisite: Senior standing.

CE 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.



ELECTRICAL AND COMPUTER ENGINEERING

John P. Palmer, *Chair*

Robert L. Bernick
Jacob I. Castleman
Yi Cheng
David L. Clark
Richard H. Cockram
Beaumont Davison
Alan P. Felzer
Lloyd Ferguson
Laurence P. Graham
Milton Hamilton
M. Kathleen Hayden
Richard J. Hermsen
Charles D. Hofmann
Hua K. Hwang
Robert G. Irvine
Kevin Jones
Alben C. Johnson
Seog Y. Kong
A. Russell Knudsen
Alexander E. Koutros
Mysore R. Lakshminarayana
Seung P. Li
John C. McMillan
Norman Nise
Mohamed Rafiquzzaman
Earl E. Schoenwetter
Owen K. Skousen
Arthur W. Sutton, Jr.
Canh G. Tran
Wendy K. Wanderman
William T. Wootton

The Department of Electrical and Computer Engineering (ECE) offers a major in electrical engineering with options in Computer Engineering, Electronics Engineering, and Power Systems Engineering. These options are similar at the freshman and sophomore levels, and they diverge at the junior and senior levels into various areas of specialization. A student must satisfy all of the requirements of one of the degree options in order to be granted a degree in electrical engineering.

The department's principal objective is to provide a sound theoretical background along with current practical engineering knowledge to each graduating engineer. The Accreditation Board for Engineering and Technology (ABET) accredited curriculum includes a large number of laboratories where practical application of classroom theory is experienced by the student. Additionally, a senior design/fabrication/evaluation project is required of all undergraduate students.

Graduates from the ECE department are in demand by a broad cross-section of industry, government, public utilities, marketing groups, and educational institutions because of the effective integration of theory and practical experience within the curriculum. The graduates are employed in design and development, in test and evaluation, in applied research, and in technical representation and sales.

For this major, the high school student should have a balanced background including mathematics and physical sciences. The transfer student should have taken courses compatible with this curriculum, especially mathematics through calculus, physics, and chemistry.

Membership is available in a student branch of the Institute of Electrical and Electronic Engineers. The department also has a chapter of Eta Kappa Nu, the national electrical engineering honor society.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Electrical Engineering	ECE	109	(3)
Computer Applications to Electrical Networks	ECE	112	(3)
Introduction to Electrical Engineering Lab	ECE	129	(1)
Physical Electronics	ECE	202	(4)
Introduction to Computer Engineering	ECE	204	(4)
Network Theory	ECE	208	(4)
Network Theory	ECE	209	(3)
Introduction to Power Engineering I	ECE	216	(2)
Electronics Lab	ECE	242	(1)
Introduction to Computer Engineering Lab	ECE	244	(1)
Networks Laboratory	ECE	252	(1)
Networks Laboratory	ECE	253	(1)
Electromagnetic Fields	ECE	302	(3)
Network Theory	ECE	307	(4)
Control Systems Engineering	ECE	309	(4)
Introduction to Power Engineering II	ECE	316	(2)
Linear Active Circuit Design	ECE	321	(4)
Power Engineering Laboratory	ECE	366	(1)
Computer Simulation of Dynamic Systems	ECE	357	(1)
Systems Laboratory	ECE	359	(1)
Basic Active Circuits Design Lab	ECE	371	(1)
Communications Systems	ECE	405	(4)
Communications Lab	ECE	445	(1)
Senior Project	ECE	461	(2)
Senior Project	ECE	462	(2)
Senior Seminar	ECE	463	(2)

OPTION COURSES FOR MAJOR

(Required for the specific option)

COMPUTER ENGINEERING

Digital Devices and Combinational Logic	ECE	341	(3)
Analysis of Digital Processing Systems	ECE	342	(3)
Digital Devices and Combinational Logic Lab	ECE	391	(1)
Digital Processing Systems Lab	ECE	392	(1)
Microprocessors for Computer Engineers	ECE	343	(3)
Microprocessor Lab for Computer Engineers	ECE	393	(1)
Introduction to Data Structures	CS	233	(4)
Any 3 of the following courses:			
Algorithmic Languages	CS	320	(4)
Computer Networking and Distributed Computing	CS	425	(4)
Theory and Design of Operating Systems	CS	431	(4)

State-Machine Design (+Lab ECE 474)	ECE	424/474	(3+1)
Selected Topics in Computer Engineering (+Lab ECE 475)	ECE	425/475	(3+1)
Advanced Logic Devices (+Lab ECE 477)	ECE	427/477	(3+1)
ECE or CS Electives **			(8)
Microcomputer Applications	ECE	432	(4)

ELECTRONICS ENGINEERING

Operational Amplifiers and Signal Conditioning	ECE	322	(4)
Instrumentation Systems	ECE	323	(3)
Introduction to Microcomputers	ECE	331	(3)
Operational Amplifiers Signal Conditioning Lab	ECE	372	(1)
Instrumentation Systems Lab	ECE	373	(1)
Introduction to Microcomputers Lab	ECE	381	(1)
Electromagnetic Fields and Applications	ECE	406	(3)
R.F. Transmission Line Laboratory	ECE	446	(1)
Any 3 of the following 6 courses:			
Filter Theory	ECE	403	(4)
Communications Systems	ECE	409	(4)
Microwave Engineering (+lab ECE 460)	ECE	410/460	(3+1)
Solid State Electronics	ECE	412	(4)
Integrated Circuit Design	ECE	418	(4)
Lasers	ECE	420	(4)
ECE Electives**			(7)

POWER SYSTEMS ENGINEERING

Electromechanics I	ECE	317	(4)
Electromechanics II	ECE	318	(4)
Electromechanics Laboratory I	ECE	367	(1)
Electromechanics Laboratory II	ECE	368	(1)
Energy Conversion Systems Engineering	ECE	421	(3)
Energy Conversion Systems—Problems and Design	ECE	422	(3)
Power Electronics	ECE	469	(2)
Energy Conversion Systems Lab I	ECE	471	(1)
Energy Conversion Systems Lab II	ECE	472	(1)
ECE Electives**			(16)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Life Science	BIO	110	(3)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Lab	CHM	151	(1)
Technical Writing	COM	219	(4)
or Egr Reports, Specs, and Proposals	ECE	311	
Principles of Economics	EC	201	(4)
Principles of Economics	EC	202	(4)
Freshman Composition	ENG	104	(4)
Analytic Geom & Calc	MAT	114	(3)
Analytic Geom & Calc	MAT	115	(3)
Analytic Geom & Calc	MAT	116	(4)
Calc of Several Variables	MAT	214	(4)
Calc of Several Variables	MAT	215	(4)
Differential Equa	MAT	216	(4)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Material Sciences and Engr	MTE	207	(3)
General Physics	PHY	131	(3)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Physics Lab	PHY	151	(1)
General Physics Lab	PHY	152	(1)
General Physics Lab	PHY	153	(1)
General Psychology	PSY	201	(4)
Advanced Science Electives **			(4)
Humanities Electives (GE-111) **			(8)
Social Science Electives (GE-IV) **			(4)
Courses to complete General Education			(12)

** Select with department approval.

Course Description

ECE 109 Introduction to Electrical Engineering (3)

Introduction to the fundamental laws of electrical engineering, applications to circuit analysis, matrix methods. 3 lectures. Prerequisite: MAT 114.

ECE 112 Computer Applications to Electrical Networks (3)

FORTRAN computer programming for ECE. Problem-oriented computer language applications to electrical networks. 3 lectures. Prerequisite: ECE 109.

ECE 129 Introduction to Electrical Engineering Lab (1)

Selected laboratory experiments emphasizing the use and operation of electrical test equipment. 1 three-hour laboratory. Prerequisite or concurrent: ECE 109.

ECE 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ECE 202 Physical Electronics (4)

Fundamentals of semiconductor physics and devices. Physical characteristics of junctions, diodes and transistors. Basic bias circuits for transistors. 4 lectures. Prerequisites: ECE 109, MAT 216, PHY 133. Concurrent: ECE 242.

ECE 204 Introduction to Computer Engineering (4)

Characteristics and applications of the basic building blocks of digital computing systems. 4 lectures. Prerequisite: ECE 112; concurrently, ECE 244.

ECE 208 Network Theory (4)

An introduction to network analysis in the time and frequency domains with computer applications. 4 lectures. Prerequisites: ECE 112, ECE 129, MAT 216, PHY 133. Concurrent: ECE 252.

ECE 209 Network Theory (3)

Network analysis in the time and frequency domains with computer applications. Continuation of ECE 208. 3 lectures. Prerequisite: ECE 208: Concurrent: ECE 253.

ECE 216 Introduction to Power Engineering I (2)

Fundamental principles of Power Engineering with emphasis on energy sources and energy conversion. Principles of magnetic fields and materials; rotating D.C. machines. Introduction to Codes and Standards as they apply to Power Engineering. Two lectures. Prerequisite or concurrent. ECE 208, 252.

ECE 220 Underwater Photography (2)

Basic principles of taking still and motion pictures in the underwater environment. Design of photographic equipment. Artificial lighting systems. Two lectures. Prerequisite: Consent of instructor.

ECE 230 Introduction to Ocean Engineering (2)

Theory and use of oceanographic and related equipment available on research vessel NAUTILUS. Includes fathometer; radar; instruments for measuring salinity, dissolved oxygen, pH, and temperature; flow meters; water sampler; bottom corer. 2 hours lecture. Prerequisites: ECE 231, or ECE 109 and 129, or ETE 103 and 215.

ECE 231 Elements of Electrical Engineering (4)

Electrical principles, DC and AC circuit analysis, simple transients, three phase circuits, industrial wiring practice, electrical instruments and measurements. For nonelectrical engineering majors. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 116, PHY 133.

ECE 232 Applied Electrical Engineering (4)

Electrical principles, DC and AC circuits analysis, three phase circuits, industrial wiring practice, electrical instruments and measurements. For Civil and Agricultural Engineering majors. Four lectures. Prerequisites: MAT 116, PHY 133.

ECE 235 Introduction to Biomedical Engineering (2)

A historical development and survey of major areas comprising biomedical engineering; anatomy and system physiology, instrumentation, artificial organs and prosthetic devices and computer applications. 2 lectures.

ECE 242 Electronic Laboratory (1)

Fundamental experiments concerned with the common types of semiconductor devices. 1 three-hour laboratory. Prerequisite: ECE 129. Prerequisite: or concurrent: ECE 202.

ECE 244 Introduction to Computer Engineering Lab (1)

Application of digital integrated circuits to demonstrate basic computing system functions. 1 three-hour laboratory. Prerequisite: ECE 129. Prerequisite: or concurrent: ECE 202, 204.

ECE 252, 253 Networks Laboratory (1) (1)

Selected laboratory exercises in electrical engineering. 1 three-hour laboratory. Prerequisite: ECE 129.

ECE 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory or a combination of both.

ECE 302 Electromagnetic Fields (3)

Static electric and magnetic fields; LaPlace, Poisson and Maxwell's equations; introduction to time varying fields. 3 lectures. Prerequisites: MAT 216, PHY 133.

ECE 307 Network Theory (4)

Analysis of network functions in the time and frequency domains. Transform methods. 4 lectures. Prerequisite: ECE 209.

ECE 309 Control Systems Engineering (4)

System representation and performance specifications. Design and analysis of feedback control system via root locus and frequency response. Compensation design techniques. 4 lectures. Prerequisite: ECE 307. Prerequisite or concurrent: ME 215.

ECE 311 Engineering Reports, Specifications and Proposals (4)

Techniques of conveying and interpreting technical information, developing a facility with engineering language, both written and oral, reading drawings, making sketches and reading schematics, technical proposals. Avoiding technical, legal and manufacturing pitfalls in engineering specification. 4 lectures. Prerequisites: ENG 104, ECE 321, 204, 216.

ECE 313 Electric Machines (3)

Physical and electrical characteristics of the more common types of DC and AC machinery. Provides background facilitating selection of appropriate machine for a specific job. Not open to ECE majors. 2 lectures, 1 three-hour laboratory. Prerequisite: ECE 231.

ECE 315 Probability and Statistics for Engineers (4)

Statistical and probabilistic concepts required for the analysis of electrical and electronic systems associated with random and systematic phenomena. Application to communication, control, instrumentation and logic systems. Lectures. Prerequisite: MAT 216.

ECE 316 Introduction to Power Engineering II (2)

Network concepts in Power System Analysis, transformers, rotating AC machines, and fundamentals of Power System operation. Two lectures. Prerequisites: ECE 216, 209, 253, or equivalent.

ECE 317 Electromechanics I (4)

Rotating machinery with emphasis on the analysis, operation and applications of DC machines. Dynamic response and control schemes including various types of DC controllers. Introduction to AC machines. 4 lectures. Prerequisites: ECE 316, 302, 366. Concurrent: ECE 367.

ECE 318 Electromechanics II (4)

Continuation of ECE 317 with emphasis on AC machines, special purpose machines, new energy conversion devices and consideration of the machine as a component of a control system. 4 lectures. Prerequisite: ECE 317, 309.

ECE 321 Linear Active Circuit Design (4)

Analysis and design of single and multiple stage transistor amplifiers. Differential, cascode and Darlington amplifiers. Large signal amplifiers. 4 lectures. Prerequisites: ECE 202, 307.

ECE 322 Operational Amplifiers and Signal Conditioning (4)

Elements of electronic circuit feedback. Operational amplifier systems. Waveshaping circuits and sources. 4 lectures. Prerequisite: ECE 321.

ECE 323 Instrumentation Systems (3)

Components of instrumentation systems. Typical power supplies and signal conditioners. A/D and D/A converters. Sensors for various parameters. Error analysis, readouts, recorders and actuators. 3 lectures. Prerequisites: ECE 322, 315, 372.

ECE 331 Introduction to Microcomputers (3)

Functional blocks of a typical microcomputer. Register architecture. Instruction sets, addressing modes and assembly language programming. Basic input/output and interfacing. Not for Computer Engineering Option. 3 lectures Prerequisite: ECE 244; concurrently ECE 381.

ECE 333 Electronic Instrumentation and Controls (4)

Principles and applications of transducers, and readouts, rotational electromagnetic devices, instrumentation systems, amplifiers and signal conditioners, and impedance matching, frequency and time response. Elementary feedback systems. For non-electrical engineering majors. 1 lecture. 1 three-hour laboratory. Prerequisites: ECE 231; MAT 216.

ECE 338 Analog Computers Lab (1)

Application of analog computers to solutions of engineering problems with emphasis on system simulation. For nonelectrical engineering majors. 1 three-hour laboratory. Prerequisite: MAT 216, ECE 333 (ECE 333 may be taken concurrently).

ECE 341 Digital Devices and Combinational Logic (3)

Boolean algebra and binary arithmetic. Design and minimization of combinational logic. Introduction to integrated circuit families and their characteristics. 3 lectures. Prerequisite: ECE 202, 244. Concurrent: ECE 391.

ECE 342 Analysis of Digital Processing Systems (3)

Sequential circuit behavior. Analysis of the structure of a basic CPU and its control system. 3 lectures. Prerequisite: ECE 341, 391. Concurrent: ECE 392.

ECE 343 Microprocessors for Computer Engineers (3)

Microcomputer architecture. Hardware and software study of a single-board microcomputer. Advanced input/output and interfacing. 3 lectures. Prerequisites: ECE 341, 391. Concurrent: ECE 393.

ECE 353 Computer Electronics I (4)

Basic principles and applications of diodes, transistors, MOS transistors. Three one-hour lectures and one three-hour laboratory. Prerequisites: PHY 133 and CS 210 or equivalent. Not open to ECE majors.

ECE 354 Computer Electronics II (4)

TTL and MOS Logic Device Application. Arithmetic Logic Units, register array and multiplexer/demultiplexer applications. Use of tristate gating. Bus systems. Three one-hour lectures, one three-hour laboratory. Prerequisite: ECE 353. Not open to ECE majors.

ECE 357 Computer Simulation of Dynamic Systems (1)

Analog and digital simulation of dynamic systems utilizing time and frequency modeling techniques. 1 three-hour laboratory. Prerequisite: ECE 307.

ECE 359 Systems Laboratory (1)

Selected laboratory exercises based upon the course work of ECE 309. 1 three-hour laboratory. Prerequisite: ECE 309.

ECE 366 Power Engineering Laboratory (1)

Selected experiments in power engineering including magnetics, transformers, machinery and power network analyzer. 1 three-hour laboratory. Prerequisite: ECE 316 (or concurrent).

ECE 367 Electromechanics Laboratory I (1)

Selected experiments in electromechanical energy conversion with emphasis on magnetics, and D.C. machines. 1 three-hour laboratory. Prerequisite: ECE 366. Concurrent: ECE 317.

ECE 368 Electromechanics Laboratory II (1)

Selected experiments in electromechanical conversion with emphasis on AC machines and their application. 1 three-hour laboratory. Prerequisite: or concurrent: ECE 318.

ECE 370 Computer System Operations (4)

Operation and procedures of a computer system, with "hands-on" experience. Machine language and operation of computers. Main frame and peripheral operation. I/O operations. Technical documentation. 3 lectures, 1 three-hour laboratory. Prerequisite: A programming language.

ECE 371 Basic Active Circuits Design Lab (1)

Design and evaluation of basic amplifier circuits, single and multistage. 1 three-hour laboratory. Prerequisite: ECE 242. Concurrent: ECE 321.

ECE 372 Operational Amplifiers and Signal Conditioning Lab (1)

Design and evaluation of feedback OP-AMP, oscillator, and signal conditioning circuits. 1 three-hour laboratory. Prerequisite: ECE 371. Prerequisite or concurrent: ECE 322.

ECE 373 Instrumentation Systems Lab (1)

Design and evaluation of selected small instrumentation systems. Error analysis, 1 three-hour laboratory. Prerequisite: ECE 372. Prerequisite: or concurrent: ECE 323.

ECE 381 Introduction to Microcomputers Lab (1)

Selected experiments with microcomputer and microprocessor integrated circuits. 1 three-hour laboratory. Concurrent: ECE 331. Not for Computer Engineering option.

ECE 391 Digital Devices and Combinational Logic Lab (1)

Application of digital devices with emphasis on their operating characteristics. 1 three-hour laboratory. Prerequisite or concurrent: ECE 341.

ECE 392 Digital Processing Systems Lab (1)

Implementation of a basic CPU and its control system using discrete integrated circuits. 1 three-hour laboratory. Prerequisite: ECE 391. Prerequisite or concurrent: ECE 342.

ECE 393 Microprocessor Lab for Computer Engineers (1)

Selected experiments with microprocessors. 1 three-hour laboratory. Concurrent: ECE 343.

ECE 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ECE 403 Filter Theory (4)

Design of passive and active filters. 4 lectures. Prerequisite: ECE 307, 322.

ECE 405 Communications Systems (4)

The study of various types of communication systems with emphasis on their analysis in the frequency domain. The role of system bandwidth and noise rejection in limiting the transmission and reception of information included. 4 lectures. Prerequisites: ECE 307, 315. Concurrent: ECE 445.

ECE 406 Electromagnetic Fields and Applications (3)

Electromagnetic fields and Maxwell's equations. Wave and wave equations, reflection and scattering of waves. Transmission line equations and solutions. Impedance matching. 3 lectures. Prerequisite: ECE 302. Concurrent: ECE 446.

ECE 407 Advanced Circuit Design (4)

Design and evaluation of advanced linear circuits utilizing state-of-the-art electronic devices. 3 lectures and 1 three-hour laboratory. Prerequisites: ECE 322, 307, 372.

ECE 408 Active Filters (4)

A continuation of active filter design and an introduction to digital filters. 4 lectures. Prerequisite: ECE 403.

ECE 409 Communications Systems (4)

Introduction to random signals and noise theory, sampling and pulse-modulation, time division multiplexing, introduction to digital communications. 4 lectures. Prerequisites: ECE 405, 445.

ECE 410 Microwave Engineering (3)

Introduction to microwave waveguides, components, scattering parameter techniques, active devices and circuits, FET amplifiers and laboratory measurements. Microwave generation and propagation. 3 lectures. Prerequisites: ECE 406 and 446. Concurrent: ECE 460.

ECE 412 Solid State Electronics (4)

Physics and technology of solid state electronic devices with emphasis on device modeling for integrated circuit applications. 4 lectures. Prerequisite: ECE 322.

ECE 413 Computer Control Engineering (4)

Analysis of digital computer control systems. Digital controllers. Real time algorithms for direct digital control and supervisory control with applications to process control. 4 lectures. Prerequisites: ECE 309 and 331.

ECE 414 Microprocessor Applications in Process Control (4)

Process control fundamentals. Analog and digital signal conditioning. Controller principles. Development of digital control algorithms for the conventional PI, PID controllers. Distributed microprocessor control systems. Three lectures, one 3-hour laboratory. Prerequisites: ECE 309 and either 331 or 343. Concurrent: ECE 454.

ECE 418 Integrated Circuit Design (4)

Analytic treatment of integrated electronics. Active and passive elements in integrated circuits. Thin film technology. Oxide isolation. Vacuum systems. Integrated circuit processing. Principles of integrated circuit design. 4 lectures. Prerequisite: ECE 322.

ECE 420 Lasers (4)

Fundamental principles and applications of lasers, energy levels and mechanisms of excitation, basic types of lasers. Q switching and modes. Modulation and detection. 4 lectures. Prerequisites: ECE 322, 372.

ECE 421 Energy Conversion Systems Engineering (3)

Advanced and special methods of analysis of power systems, symmetrical components, representation of power systems, use of AC network boards, analog and digital computers for the solution of systems problems, power system transmission line concepts. 3 lectures. Prerequisites: Senior standing and ECE 318. Concurrent: ECE 471.

ECE 422 Energy Conversion Systems—Problems and Design (3)

System stability and fault conditions, specific design considerations, load flow studies, economic operation practices. Standards and requirements governing industrial and utility system operations. 3 lectures. Prerequisite: ECE 421. Concurrent: ECE 472.

ECE 424 State-Machine Design (3)

Automata Theory. Design and simplification of state machines. 3 lectures. Prerequisites: ECE 342, 392, CS 233. Concurrent: ECE 474.

ECE 425 Selected Topics in Computer Engineering (3)

Selected topics in Computer Engineering including design of control stores, bit-slice architecture, field programmable logic. 3 lectures. Prerequisite: ECE 424. Concurrent: ECE 475.

ECE 427 Advanced Digital Devices (3)

The study and application of specific digital integrated circuits, such as fast multipliers, register files, transparent latches, UARTs and FIFOs. 3 lectures. Prerequisite: ECE 392. Concurrent: ECE 477.

ECE 428 Digital Signal Processing (4)

A continuation of digital filter design and an introduction to digital signal processing algorithms. 4 lectures. Prerequisite: ECE 408.

ECE 430 Ocean Engineering (4)

The practice of engineering as applied to various aspects of the ocean environment. Underwater and surfaces work vessels, engineering applied to coastal processes, ports and harbors, offshore practice, mining, oil drilling, aquaculture. 4 lectures. Prerequisites: ECE 333 or equivalent, ME 215, and completion of junior level courses in School Engineering.

ECE 432 Microcomputer Applications (4)

Microcomputer applications at the systems level. Course to include usage of both hardware and software design aids. 3 lectures, 1 three-hour laboratory. Prerequisite: ECE 343, 393.

ECE 434 Underwater Electronics (4)

Electronic instrumentation for basic underwater measurements of ocean currents, wave motion, pressure water analysis, etc. Data buoy system. Underwater instrumentation systems. Data transmission from underwater sites. 4 lectures. Prerequisites: ECE 323 or 333.

ECE 435 Biomedical Instrumentation and Measurements (3)

Discussion of major body systems in terms of their physiology, measurable parameters and current instrumentation. The application of sound engineering principles to obtain reliable physiological data. A system design. 3 lectures. Prerequisites: BIO 115, ECE 323 or 333, or consent of instructor. Concurrent: ECE 485.

ECE 436 Optical Fiber Communications (4)

Introduction to optical fibers and optical fiber cables. Coupling and cabling. Optical sources and detectors and their application to optical communications. Modulation methods. Noise in detectors. Design and evaluation of optical transmitters, receivers, repeaters and multinetworks. Design specifications, options, tradeoffs and cost. Integrated optics and laser technology applied to optical communications. New developments. 4 lectures. Prerequisites: ECE 322 and ECE 302.

ECE 440 Underwater Sound (4)

Principles of underwater sound, propagation and reception. The sonar equation. Transducer design and calibration. Four lectures. Prerequisite: ECE 434 and Junior standing in Engineering or Science.

ECE 445 Communications Lab (1)

Demonstrations of the individual aspects of communication techniques. 1 three-hour laboratory. Concurrent: ECE 405.

ECE 446 R. F. Transmission Line Laboratory (1)

Experimental consideration of the characteristics and behavior of RF transmission lines. Stub matching and transmission line parameter measurements by several methods. 1 three-hour laboratory. Concurrent: ECE 406.

ECE 448 R.F. Design (4)

Principles of R.F. design of transmitters and receivers utilizing solid state electronics devices and integrated cirtcuits. Design of oscillators, power amplifiers, mixers and detectors. Three lectures and one 3-hour laboratory. Prerequisites: ECE 322, 406 or consent of instructor.

ECE 454 Microprocessor Lab for Process Control (1)

Selected experiments in process control fundamentals using a microprocessor. 1 three-hour laboratory. Concurrent: ECE 414.

ECE 460 Microwave Engineering Laboratory (1)

Selected experiments in microwave engineering. 1 three-hour laboratory. Concurrent: ECE 410.

ECE 461, 462 Senior Project (2) (2)

Completion of a project under faculty supervision. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: ECE 463.

ECE 463 Undergraduate Seminar (2)

New developments, policies, practices, procedures and ethics in electrical and computer engineering. Each student is responsible for the preparation of an approved project proposal in the field of electrical and computer engineering. 2 lectures. Prerequisite: Completion of all 100–300 level required courses.

ECE 469 Power Electronics (2)

Selected topics in power electronics and special purpose machines with experimentation on solid state drives and various controllers. 1 hour lecture and 1 three-hour laboratory. Prerequisites: ECE 316, 366 and senior standing.

ECE 471 Energy Conversion Systems Lab I (1)

Selected experiments with power systems and power transmission. 1 three-hour laboratory. Concurrent: ECE 421.

ECE 472 Energy Conversion Systems Lab II (1)

Selected experiments in power generation and transmission. 1 three-hour laboratory. Prerequisite: ECE 471. Concurrent: ECE 422.

ECE 474 State Machine Lab (1)

Selected experiments pertaining to state machines. 1 three-hour laboratory. Concurrent: ECE 424.

ECE 475 Computer Engineering Lab (1)

Selected experiments in computer engineering. 1 three-hour laboratory. Concurrent: ECE 425.

ECE 477 Advanced Digital Devices Lab (1)

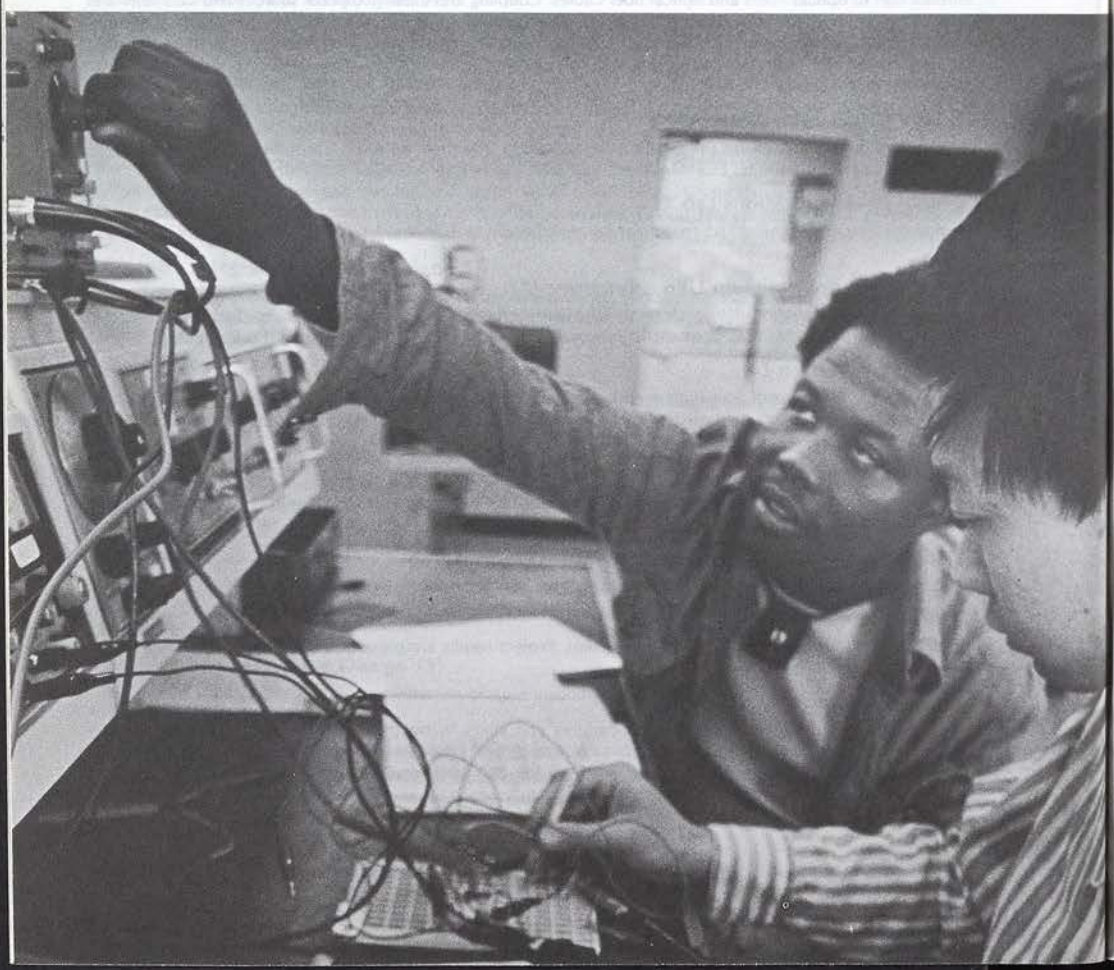
Selected experiments with digital devices. 1 three-hour laboratory. Concurrent: ECE 427.

ECE 485 Biomedical Instrumentation and Measurements Lab (1)

Selected Experiments pertaining to biomedical instrumentation. 1 three-hour laboratory. Concurrent: ECE 435.

ECE 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory or a combination of both.



ENGINEERING TECHNOLOGY

Samuel L. Pritchett, *Acting Chair*

Thomas Aldington
Donald E. Breyer
John S. Buhr
Richard G. Camp, Jr.
Donald C. Curran
Donald W. King
Earl E. Schoenwetter
Paul Stymelski
Anthony L. Tilmans

The department offers courses leading to a bachelor of science degree in engineering technology. The program has a flexible, broad curriculum to enable students to match their talents and interests with a career objective, and emphasizes the upper division education of technology graduates from community colleges. Students having a certificate or an associate's degree in technology from a community college should be able to complete degree requirements in two additional years.

Engineering technology is concerned primarily with the application of established scientific and engineering knowledge and methods. Elective courses will permit each student to pursue an area of interest (e.g., aerospace, electronics, construction, mechanical, manufacturing, plant). An advisor will coordinate the curriculum for each student. All students will have required courses in the shops and laboratories where they learn to use instruments and equipment which are characteristic of their career objective. Fundamentals and basic engineering principles will be taught in terms of typical problems which require applied solutions for industry.

Industrial specialization in this country continues to increase the need for engineering teamwork, and engineering teams require both engineering technologists and engineers.

The Engineering Technology curriculum has been accredited by the Accreditation Board for Engineering and Technology.

CORE COURSES FOR MAJOR

(Required of all students)

Computer Programming for ET	ETT	110	(4)
Applied Statics	ETT	210	(3)
Applied Dynamics	ETT	211	(3)
Strength of Materials for ET	ETT	220	(4)
Materials Joining	ETT	234	(2)
Engin. Econ Analysis for ET	ETT	305	(4)
or Construction Economy	ETC	301	(4)
Engineering Materials	ETT	307	(4)
Applied Fluid Mechanics	ETT	310	(4)
Undergraduate Seminar	ETT	460	(2)
Senior Project	ETT	461	(2)
Senior Project	ETT	462	(2)
Engineering Design Graphics	MFE	121	(2)
Descriptive Geometry	MFE	125	(2)
Computer Aided Drafting	MFE	210	(2)
Non-Area Tech Elective			(4)
Manufacturing Process Electives			(4)
Engineering Technology Electives			(59)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Life Science	BIO	110	(3)
College Chemistry	CHM	104	(3)
College Chemistry Lab	CHM	141	(1)
Tech Writing	COM	219	(4)
Principles of Economics	EC	201	(4)
or Principles of Economics	EC	202	
Freshman Composition	ENG	104	(4)
Trigonometry	MAT	106	(4)
College Algebra	MAT	105	(4)
Technical Calculus	MAT	130	(4)
Technical Calculus	MAT	131	(4)
College Physics	PHY	121	(3)
College Physics Lab	PHY	141	(1)
College Physics	PHY	122	(3)
College Physics Lab	PHY	142	(1)
College Physics	PHY	123	(3)
College Physics Lab	PHY	143	(1)
Introduction to Statistics	STA	107	(3)
Psychology	PSY	201	(4)
Social Science Elective			(4)
Speech Elective			(4)
Humanities Elective			(8)
Upper Division General Ed Elective			(12)

(See Dept. options categories)

Course Descriptions

ETT 110 Computer Programming for Engineering Technologists (4)

Structure and operation of computer systems. Block diagramming, documentation and programming problems applicable to the various fields of Engineering Technology. 3 lectures, 1 three-hour laboratory.

ETT 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ETT 201 Electrical Technology (4)

Introduction to operation and application of basic electrical measuring instruments. D.C. and A.C. circuit applications involving resistance, inductance and capacitance. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 123 or equivalent. Not open to Electrical Emphasis E.T. students.

ETT 210 Applied Statics (3)

Introduction to the basic concepts of mechanics emphasizing the action of forces on rigid bodies and the response of those bodies to the applied forces. Methods for logical solutions to engineering problems are stressed. 3 lectures. Prerequisite: MAT 130, PHY 121.

ETT 211 Applied Dynamics (3)

Application of the theory of motion of rigid bodies with acceleration from applied forces. Emphasis on problems in which those bodies can be considered as non-rotating. Introduction to plane motion with rotation. Uses analytical methods. 3 lectures. Prerequisite: ETT 210.

ETT 220 Strength of Materials for Engineering Technology (4)

Stress-strain diagrams, tension and compression, working stresses and factors of safety, torsion in shafts, stresses in beams, riveted joints, welded connections, columns. 3 lectures, 1 three-hour laboratory. Prerequisite: ETT 210 or equivalent.

ETT 234 Materials Joining (2)

Methods of materials joining used in modern industry as applied to metals and plastics. Introduction to evaluation methods. 1 lecture, 1 three-hour laboratory.

ETT 270, 370, 470 Engineering Technology Internship (4) (4) (4)

Supervised on-the-job engineering technology employment. Analytical reports of assigned tasks and relevant engineering technology publication reviews. Full-time employment. Prerequisite: Internship must be approved in advance by department coordinator.

ETT 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ETT 305 Engineering Economics Analysis for Engr. Technology (4)

Fundamental principles and basic techniques of economic analysis of engineering and manufacturing projects. Topics such as costs and their estimation, time value of money, economic evaluation criteria, basic comparative models, and replacement analysis. Consideration of income taxes, risk, and intangibles. 4 lectures. Prerequisite: MAT 105 or equivalent.

ETT 307 Engineering Materials (4)

Concepts of the structure and properties of materials and their relevance to industrial applications, properties of metals, ceramics, plastics, composites, and semiconductors. 3 lectures, 1 three-hour laboratory. Prerequisite: CHM 104 or equivalent.

ETT 310 Applied Fluid Mechanics (4)

Applied principles of fluid flow. Properties of fluids. Fluid impulse and momentum. Viscous flow in pipes and open channels. 3 lectures; 1 laboratory. Prerequisites: ETT 210, MAT 131.

ETT 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ETT 421 Technology Assessment (4)

An introduction to the social, economic and humanitarian implications resulting from technological advancements, including philosophy and substantive techniques. Case studies of technology assessments are reviewed, as students, working in teams, proceed on a technology assessment project. 4 lectures. Prerequisite: Senior standing.

ETT 460 Undergraduate Seminar (2)

Seminar discussion of new developments, policies, practices and procedures. Preparation and oral presentation by each student of his/her senior project, 2 hours seminar per week. Prerequisite: Senior standing.

ETT 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Presentation of project in a formal report. Minimum 120 hours total time. Prerequisite: COM 219, ETT 460 and senior standing.

ETT 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ETA 222 Aerospace Construction Laboratory (2)

Techniques, procedures, materials and tools involved with manufacture and maintenance of aerospace structures. Light metal forming, joining and riveting, piping. Use of plastics. 2 three-hour laboratories. Prerequisite: MFE 230, ETT 234.

ETA 301 Applied Aerodynamics (4)

The atmosphere, dynamics and thermodynamics of air, airspeed determinations, types of fluid flow, fluid friction, airfoil theory, wing theory, lift, induced drag, parasite drag, power. 4 hours lecture. Prerequisite: ETT 310.

ETA 323 Wind Tunnel Testing (2)

Theory and operation of the subsonic and supersonic wind tunnel. Testing and instrumentation methods. Model design. Analysis of test results. 2 three-hour laboratories. Prerequisite: ETA 301.

ETA 324 Applied Aerospace Structures (4)

Aerospace vehicle load factors. Shear and moment computation, beam deflection. Analysis of thin web structural sections: bending, torsion, buckling. Truss analysis. 4 lectures. Prerequisite: ETT 220.

ETA 349 Aerospace Structures Laboratory (2)

Structural testing of aerospace vehicle components. Strain gage, photoelastic and stress coat methods. Instrumentation of components for testing. 2 three-hour laboratories. Prerequisite: ETA 324.

ETA 405 Principles of Flight (4)

Performance analysis of propeller and jet aircraft. Lift and drag analysis. Stability and control, static and dynamic balance, wing moments, operation of control surfaces. 4 lectures. Prerequisite: ETA 301.

ETA 415 Aerospace Powerplants (4)

Analysis of reciprocating, turboprop, turbojet and rocket engines with respect to fuel burning performance, thermodynamic analysis, structural and mechanical requirements. 4 lectures. Prerequisite: ETM 306.

ETA 425 Jet Engine Laboratory (1)

Performance testing of typical jet engines. Experimental determination of engine performance parameters such as air mass flow rate, thrust and specific fuel consumption. 1 three-hour laboratory. Prerequisite: ETA 415 or equivalent.

ETA 427 Introduction to Aircraft Design (2)

The process of conceiving and creating a useful mechanism or whole system, using case examples from the aircraft industry. Consideration of constraints and methods of optimizing the design will be emphasized. 1 two hour lecture/discussion. Prerequisite: Senior standing in aerospace or mechanical area of emphasis in technology.

ETA 437 Aircraft Applied Design (2)

Preliminary design of aircraft in response to a request for proposal. Includes effects of configuration and aerodynamic characteristics. Performance, structural integrity and stability. 2 three-hour laboratories. Prerequisite: ETA 405, 415.

ETC 101 Construction Engineering (3)

An introduction to construction engineering. An overview of the construction engineering program, the scope of the field of construction engineering and the responsibilities of the construction engineer. 3 lectures.

ETC 102 Construction Drafting (3)

Structural, topographic, plan and profile and surveying drawing practices. Line and lettering work, use of drafting machines and office practices are stressed. 1 lecture, 2 three-hour laboratories. Prerequisite: MFE 121 or equivalent.

ETC 131 Construction Surveying (4)

Fundamental surveying methods as applied to construction layout. Use of transit and level for location and control of structures. Vertical and horizontal control. 2 lectures, 2 three-hour laboratories. Prerequisite: MAT 104.

ETC 132 Construction Surveying (4)

Profile surveys; borrow pit and earthwork measurements and distribution analysis. Highway curves—horizontal and vertical. 2 lectures. 2 three-hour laboratories. Prerequisite: ETC 131.

ETC 202 Construction Materials (3)

Properties of materials used in building and heavy construction. 3 lectures. Prerequisite: ETC 101 or equivalent.

ETC 204 Construction Inspection (3)

Inspection responsibilities, authority, licensing and registration requirements related to heavy and building construction. 3 lectures. Prerequisite: None.

ETC 270 Electrical Installations (4)

Fundamentals of electrical equipment and installations as related to the construction industry. Electrical wiring, transformers, machines, illumination, heating, wiring codes and specifications. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 123 or equivalent. Not open to Electrical Emphasis E.T. students.

ETC 279 Engineering Cost Accounting (3)

Fundamental concepts, definitions and terminologies of engineering cost accounting. Basic techniques and policies commonly employed in engineering cost accounting systems by industry. 2 lectures, 1 three-hour laboratory. Prerequisite: MAT 105. ,

ETC 301 Construction Economy (4)

Fundamental principles and basic techniques of cost analysis of equipment and facility ownership, retirement and replacement, considering the time value of money, income taxes and risk. 4 lectures. Prerequisite: MAT 105 or equivalent.

ETC 304 Construction Estimates (4)

Fundamentals of building construction estimating procedures, considering equipment, labor, material and overhead costs. 4 lectures. Prerequisite: Junior standing.

ETC 305 Construction Estimates (4)

Fundamentals of heavy construction estimating procedures considering equipment, labor, material and overhead costs. 4 lectures. Prerequisite: ETC 304.

ETC 311 Structural Theory (3)

Introduction to structural systems used in construction projects. Design loads. Analysis of statically determinate beams, frames, and trusses for forces and deflections using analytical and graphical methods. Introduction to statically indeterminate structures using moment distribution. 3 lectures. Prerequisite: ETT 220.

ETC 312 Construction Equipment and Methods (3)

Construction procedures, job planning layout and scheduling, selection and application of construction equipment to building and heavy construction projects. 3 lectures. Prerequisite: Junior standing.

ETC 315 Timber & Formwork Design (4)

Properties of wood. Design loads. Design of wood structural elements including beams, columns, beam-columns, and plywood diaphragms. Connection design. Application of timber design to the construction project including the design of concrete formwork and falsework for slabs, beams, columns and walls. 4 lectures. Prerequisite: ETC 311.

ETC 316 Steel Design (3)

Design of structural steel elements including tension members, columns, beams, and beam-columns. Design of welded, riveted, and bolted connections. AISC specifications. 3 lectures. Prerequisite: ETC 311.

ETC 317 Concrete and Masonry Design (3)

Design of concrete and reinforced masonry. Structural elements including beams, walls, retaining walls and footings. ACI specifications. 3 lectures. Prerequisite: ETC 315.

ETC 402 Contracts and Specifications (3)

Basic principles and detailed review of design drawings and contract documents, including plans, specifications and agreements involved in the construction of facilities. 3 lectures. Prerequisite: Senior standing.

ETC 403 Construction Safety (3)

Safety engineering in construction, considering safety legislation, OSHA. Safety programs, accident prevention and public safety. 3 lectures. Prerequisite: Senior standing.

ETC 405 Construction Planning (3)

Methods and procedures used in planning, and scheduling related to construction projects. Principles of Critical Path Method (CPM) techniques will be emphasized. 3 lectures. Prerequisite: ETT 110.

ETC 406 Construction Organization and Management (3)

Contractor's policies and procedures used for centralized and/or job-site management of construction projects. Personnel job descriptions and assignments, and their relationship to the functional structure of an organization. Material procurement and control. 3 lectures. Prerequisite: Senior standing.

ETC 407 Construction Cost Control (3)

The study of cost engineering. Emphasis will be on real life problems and practices of planning and cost control, and the interrelationship of this discipline with the scheduling engineer, the accountant, and the estimator, as well as with the Project Team, home office, lenders, owners, and contractors/subcontractors. 3 lectures. Prerequisite: Upper division standing.

ETC 411 Foundations and Soil Mechanics (4)

Selection and methods of installation of foundations and other soil-supported structures. Footings, piles, caissons, retaining structures, soil embankments and fills. 3 lectures, 1 three-hour laboratory. Prerequisite: ESC 321 or equivalent.

ETC 431 Concrete Mix Design (2)

Theory and practice of concrete materials and the methods utilized in the mix design, production, placement and testing of structural concrete. 1 lecture, 1 laboratory. Prerequisite: Senior standing.

ETC 432 Bituminous Pavement Design (3)

Theory and practice of asphalt pavement structure design. The properties of asphaltic concrete materials and the methods utilized in production, placement and testing of asphaltic pavement. 2 lectures, 1 three-hour laboratory. Prerequisite: ETC 431.

ETE 102, 103 Electrical Circuits (4) (4)

D.C. and A.C circuit analysis involving resistance, inductance and capacitance. Basic magnetic circuits. Theory of operation and application of basic electrical measuring instruments. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 104 or equivalent.

ETE 203, 204, 205 Electronic Devices and Circuits (4) (4) (4)

A study of vacuum, gaseous and semiconductor electronic devices. Operating characteristics, parameters, biasing and circuit applications, algebraic and graphical analysis of circuits. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 103 or equivalent.

ETE 210 Electrical Circuit Analysis (4)

Single phase and polyphase circuit applications. Resonant circuits and filter networks, two-port parameters, magnetic circuits and transformers. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 103 or equivalent.

ETE 215 Electronic Circuits (5)

Electronic circuit analysis involving single stage amplifiers, bi-polar and field effect transistors. D.C. stability design and analysis, small signal parameters and A.C. equivalent circuits. For transfer students. 4 lectures, 1 three-hour laboratory. Prerequisite: Community college course in electronic devices.

ETE 230 Introduction to Digital Logic (4)

Introduction to applied Boolean algebra and number systems. Logic circuit families. Logical building blocks— gates, multivibrators and memory elements. Applied design and laboratory. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 204 or equivalent.

ETE 314 Linear Amplifier Circuits (4)

Thermal stability, small signal equivalent circuits, multistage and large signal amplifiers, frequency response, feedback amplifiers and oscillators. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 205 or equivalent.

ETE 315 Digital Logic Systems (4)

Digital circuit design and analysis using registers, counters. Sequential networks. Implementation of binary operations. Semiconductor memories. Conversions A-D and D-A. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 230 or equivalent.

ETE 318 Integrated Circuits (4)

Fabrication and characteristics of monolithic operational amplifiers. Basic applications and classical circuits. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 314 or equivalent.

ETE 319 Linear Circuit Applications (4)

Practical applications of currently available monolithic circuit devices in linear and digitally-related linear electronic circuits. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 318.

ETE 320 Electrical Machines (4)

A.C. and D.C. machines including associated equipment and control circuits. Machine ratings, test methods and industrial standards. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 210 or equivalent.

ETE 340 Computer Organization (4)

Generalized registers, arithmetic units and buss organization. Memory system principles, computer peripherals. Basic system architecture. System project. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 315.

ETE 346 Advanced Digital Devices (4)

Characteristics and application of medium and large scale integrated circuit devices used in logic systems and related applications. Includes study of the Arithmetic Logic Unit, Phase Lock Loop, Multipliers, Numerical Displays and Multiplexors. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 315 or consent of instructor.

ETE 360 Electronic Systems Troubleshooting (4)

Theory of electronic troubleshooting, special testing methods, failure diagnosis. Component operational theory. Maintenance, repair and safety procedures. 3 lectures, 1 three-hour laboratory. Prerequisites: ETE 210, 314 or equivalent.

ETE 420 Electronic Test Instrumentation (4)

Fundamentals of electronic test instrumentation. Theory and function of principal types of laboratory electronic test equipment such as electronic meters, oscilloscope, signal generators, counters, laboratory potentiometers and bridges, and various other analyzing test equipment for DC, AF, and RF voltages and currents. 3 lectures, 1 three-hour laboratory. Prerequisites: ETE 318, STA 107, MAT 130, or equivalent, or consent of instructor.

ETE 425 Electronic Precision Measurements (4)

Elelctronic Precision measurement techniques. Typical experiments. Calibration; measurements of precision on electrical equipment of parameters. Basic electrical and magnetic test equipment; basic standards. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 420, ETM 330 or equivalent, STA 107 or consent of instructor.

ETE 435 Communication Systems (4)

The study of periodically gates, amplitude, single sideband, and frequency modulation methods involved in communications systems. Receivers and telemetry systems. 3 lectures, 1 three-hour laboratory. Prerequisites: ETE 314 and MAT 131 or equivalent.

ETE 437 RF Measurements (4)

Electronic measurement equipment and techniques for measurements at radio frequencies of such quantities as power, impedance, standing wave ratio, frequency, voltage, and current, Smith Charts, impedance matching, radio receiver measurements, antenna measurements. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 335 or equivalent, MAT 131 or equivalent.

ETE 438 Microwave Techniques (4)

Microwave safety, generation, transmission, wave guides, wave guide components and measurements. Microwave measurement systems and techniques. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 131, ETE 437, or consent of instructor.

ETE 440 Computer Organization (4)

Generalized registers, arithmetic units and bus organization. Memory system principles, computer peripherals. Basic system architecture. System project. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 315.

ETE 442 Digital Communications (4)

Data communication concepts and techniques; MSI circuits in digital data communication; information codes; error detection codes; line control procedures; modes of transmission; concentrators and distributed intelligence. 3 lectures. 1 three-hour laboratory. Prerequisite: ETE 440.

ETE 444 Microprocessors (4)

A survey of present day microprocessor technology. Analysis and operation of a selected microprocessor. Memory and interfaces. Basic programming and hardware applications with laboratory hands-on experience. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 440 or equivalent, ETT 110.

ETE 445 Microprocessor Applications (4)

Microprocessor applications at a system level. Use of hardware and software design aids; assemblers; text editors and ROM emulators. System projects related to a specific microprocessor. 3 lectures. 1 three-hour laboratory. Prerequisite: ETE 444.

ETE 448 Digital Computer Operations (4)

Operation of a digital computer. Familiarization with console control, register operations and functioning of peripheral equipment within an integrated system. Performance of maintenance and diagnositc routines. 3 lectures. 1 three-hour laboratory. Prerequisite: ETE 315.

ETE 449 Computer Maintenance (4)

Digital computer diagnostic methods using the HP-1000 computer. Hardware and software techniques for identifying and isolating hardware malfunctions. Peripheral device operation and maintenance emphasized. 3 lectures, 1 three-hour laboratory. Prerequisite: ETE 448 or consent of instructor.

ETE 455 Laser Technology (4)

Introduction to lasers. Basic laser theory. Laser modulation and detection. Characteristics of solid, liquid, gaseous and semiconductor lasers. Laser technology applied to various fields. 4 lectures. Prerequisite: ETE 314 or equivalent.

ETE 480 Biomedical Electronics (4)

An introduction to biomedical engineering overview of basic psysiological parameters and measurement techniques; transducers, electrodes and available systems; testing standards and codes; safety. 3 lectures. 1 three-hour laboratory. Prerequisite: Senior standing or consent of instructor.

ETM 306 Applied Thermodynamics (4)

Applications of fundamental concepts of work, heat, energy. Basic power and refrigeration cycles, and reciprocating machines. First and second law of thermodymanics as applied to engineering technologist. Use of generalized charts and handbooks in solving thermodynamic problems. 4 lectures. Prerequisite: PHY 122, ETT 210.

ETM 308 Applied Heat Transfer (3)

Survey of the application of empirical and algebraic equations used in the solution of practical and laboratory type of heat transfer problems. Includes three modes of heat transfer: conduction, convection, and radiation. 3 lectures. Prerequisite: ETM 306, ETT 310.

ETM 315 Machine Elements (4)

The practical application of the fundamentals of mechanics and the strength of materials to the design of machine elements. 3 lectures. One three hour laboratory. Prerequisite: ETT 307, 220.

ETM 320 Power Transmission Systems (4)

Introduction to the elements of power transmission systems, including shafting, couplings, belts, chains, gears, clutches, fluid couplings and fluid pumps and motors. Theory and operation of power transmission systems composed of above elements. 3 lectures, 1 three-hour laboratory. Prerequisite: ETT 220, ETM 315.

ETM 324 Applied Mechanisms (4)

A study of the elements of mechanisms; cams, gears, kinematics. 3 lectures, 1 three-hour laboratory. Prerequisite: MFE 121, ETT 210.

ETM 330 Instrumentation Applications (4)

Application of engineering measurement techniques, pressure gages, calibration and servicing, strain gages and strain indicators, pressure transducers and instrumentation, thermocouples and instrumentation. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 123, ETT 201 or equivalent.

ETM 334 Applied Heating and Air Conditioning (4)

Thermal environmental requirements for human habitation. Psychrometircs. Building heating and cooling loads. Air-handling equipment. 4 lectures. Prerequisites: ETM 306, ETT 310.

ETM 335 Heating and Air Conditioning (4)

Heating equipment; refrigeration systems and equipment. Design of a complete system of compatible components for the control of thermal environment. 3 lectures, 1 three-hour laboratory. Prerequisite: ETM 334 or equivalent.

ETM 410 Internal Combustion Engines (3)

Theory and performance of internal combustion engines including spark ignition, diesel and gas turbine. Operation of carburetion, ignition and cooling systems. Selection and rating of fuels. 2 lectures, 1 three-hour laboratory. Prerequisite: ETM 306.

ETM 436 Air Conditioning Systems (4)

Air conditioning system types and characteristics; criteria for selection of system type; air conditioning system controls; safety and building code requirements. 3 lectures, 1 three-hour laboratory. Prerequisite: ETM 335.

ETP 276 Production Control (4)

Principles of planning and controlling production activities; product development, forecasting, scheduling and loading, routing, material control, dispatching, progress reporting and corrective action. Design of production control systems. 3 lectures, 1 three-hour laboratory. Prerequisites: MFE 221, 230.

ETP 302 Industrial Safety (3)

An introduction to the problems of industrial safety. Emphasis upon accident prevention and control. Covers state and federal OSHA regulations and implications of the Williams-Steiger Occupational Safety and Health Act of 1970. 3 lectures. Prerequisite: Junior standing.

ETP 305 Manufacturing Engineering Technology Supervision (3)

A study of technological and professional specialization in engineering supervision within manufacturing engineering. This course will cover an overview of manufacturing engineering as it relates to the translation of ideas into marketable products. Emphasis is placed upon technological and professional specialization in engineering supervision within manufacturing engineering. 3 lectures. Prerequisite: Junior standing or consent of instructor.

ETP 307 Manufacturing Engineering Technology Management (3)

A study of technological and professional specialization in engineering management within manufacturing engineering. This course covers key concepts in organizing for manufacture. Emphasis is placed upon decision making to develop a balanced manufacturing system. 3 lectures. Prerequisite: ETP 305 or consent of instructor.

ETP 308 Applied Metallurgy (3)

Structural and phase changes resulting from plastic deformation and thermal treatments. Application economics in the selection of metals and metallurgical processing. 3 lectures. Prerequisite: ETT 307.

ETP 310 Technical Sales (3)

The pricing and distribution of manufactured goods. Micro-economic studies applied to the small independent manufacturer as well as examination of large manufacturing distribution techniques. Case studies and seminar discussions. 3 lectures. Prerequisite: Junior standing.

ETP 323 Production Drafting (2)

Continuation of engineering graphics with emphasis upon industrial practice. Preparation of working drawings. 2 three-hour laboratories. Prerequisite: MFE 121 or equivalent.

ETP 355, 356 Production Machining (3) (3)

Precision machining operations with emphasis on methods used in mass production. Cutting tools and fluids used in production machining. Selection of machines and tooling for production operation. 2 lectures, 1 three-hour laboratory. Prerequisite: MFE 222 or equivalent.

ETP 365 Pressed Metal Technology (3)

A study emphasizing the techniques in pressed metal design. Machine types, characteristics, and capabilities are stressed with reference to function and economical factors. Hot and cold working of materials. 2 lectures, 1 three-hour laboratory. Prerequisite: MFE 230.

ETP 371 Production and Facilities Planning (4)

Concepts and methods of planning engineering projects, production programs, and plant layouts and facilities. Loading and scheduling, product and process planning, facilities analysis, layout planning, and materials analysis. 3 lectures, 1 three-hour laboratory. Prerequisite: ETP 276 or equivalent.

ETP 372 Printed Circuit and Electronic Packaging Technology (3)

Fundamental principles and basic techniques of manufacturing with particular emphasis on printed circuit and electronic packaging technology. Topics such as process and product development procedures, wiring techniques, circuit packaging materials and processes, cost. 2 lectures, 1 three-hour laboratory. Prerequisite: MFE 246 or equivalent.

ETP 373, 374 Tool and Die Technology (3) (3)

An introduction to tool and die fundamentals. Function, components, and appropriate manufacturing techniques are stressed. Die life, maintenance, storage, and safety are included. 2 lectures, 1 three-hour laboratory. Prerequisite: MFE 222, 230.

ETP 375 Quality Assurance (2)

Quality planning, analysis and control. Inspection systems, process control techniques, and acceptance sampling methods. Use of statistical and other methods for assuring desired quality levels. 2 lectures. Prerequisite: STA 107.

ETP 377 Systems Engineering (3)

Study and use of systems engineering methods. Analysis, application and computation of statistical methods and mathematical programming procedures to engineering and industrial systems. 2 lectures, 1 three-hour laboratory. Prerequisite: STA 107, ETT 110.

ETP 381 Foundry Techniques (2)

Design and production of patterns. Sand system and metallurgical properties influencing castings. Thermal control and heat treating of casting to achieve engineering properties. Gate and riser design. Students will work with sand, investment, centrifugal and die casting. 1 lecture, 1 three-hour laboratory. Prerequisite: IME 134, ETT 307.

ETP 395 Non-Traditional Manufacturing Processes (2)

A study of specialized material removal and forming processes such as ECM, EDM, etc. Specific industrial operations and processes are analyzed with references to theory of operation, applications and economic considerations. 2 lectures. Prerequisites: MFE 222, MFE 230.

ETP 404 Manufacturing Engineering Technology Administration (3)

A current appraisal of knowledge, skill and judgment required of an administrative manufacturing engineer in the areas of processes, materials, tool control, operations, plant layout and material handling, quality control, methods, production and production as forms of manufacturing manufacturing engineering. 3 lectures. Prerequisite: ETP 307, or equivalent.

ETP 405 Manufacturing Engineering Material Management (3)

A technical examination of manufacturing engineering material management referenced to the total integrated system of converting raw material into a finished product. 3 lectures. Prerequisite: Senior standing.

ETP 407 Manufacturing Engineering Value Analysis (3)

Selected topics and problems utilizing value analysis as a tool for determining the proper relationship between price, cost, and value received. An integration of technical and economical factors of quality. 3 lectures. Prerequisite: Senior standing.

ETP 408 Manufacturing Control (3)

This course in the area of technological management deals with an overview of all the various phases of starting up, operating, and maintaining an owner-managed manufacturing company. Emphasis is placed upon economic justification of alternate courses of action open to the manufacturing entrepreneur. 3 lectures. Prerequisite: Senior standing.

ETP 432 Applied Weld Design (4)

Design and performance of welded joints. Effects of variations in materials and processes and their relation to tooling. 3 lectures, 1 three-hour laboratory. Prerequisite: ETT 210, 234, ETP 308.

ETP 437, 438 Nondestructive Evaluation (2) (2)

Discontinuities in materials and their detection. Process principles and equipment for penetrant, magnetic particle, ultrasonic radiographic and eddy current methods. Reference to other processes. Radiation health physics. 1 lecture, 1 three-hour laboratory. Prerequisite: ETT 307.

INDUSTRIAL AND MANUFACTURING ENGINEERING

Joseph Wymer, *Chair*

Klaus D. Bauch
Bratcher L. Bright
Daniel H. Fillhart
Edward D. Galbraith
Leonhard M. Myers
John D. O'Neil
Robert A. Quaney
Panchatcharam Ramalingam
Phillip R. Rosenkrantz
Roger C. Scherer
Richard H. Schippers
J. Garrard Wright
Joseph P. Wymer

The department offers two majors. Both prepare students for the professional practice of engineering. The industrial engineering major is concerned with the most effective methods of using people, material, and equipment in both production and service organizations. The manufacturing engineering major is concerned with the most effective ways of making products for consumers, industry, and society in general.

Industrial Engineering

The industrial engineering approach is a unique application of engineering design and analysis techniques. Industrial engineers are the general practitioners of engineering. They deal with people and their characteristics, material and its movement, and the acquisition and operation of equipment.

The industrial engineering program has been accredited by the Accrediting Board for Engineering and Technology. It consists of four sequences of courses. The basic sciences and mathematics and the humanities and social sciences category are similar to those of other Cal Poly Pomona engineering curricula. The engineering sciences develops skill in statistical and optimal techniques that are important in industrial engineering. The engineering analysis, design, and systems sequence develops skill in the specification, prediction, and evaluation of integrated systems of people, materials, and equipment. It is design based on people and their characteristics that sets industrial engineering apart from other major branches of engineering.

Industrial engineers are involved with every type of organization, from production firms to service organizations such as hospitals, amusement centers, etc. The work is rarely dull and routine and can lead to challenging and unusual assignments that provide a doorway to many career opportunities.

Industrial engineering students are encouraged to join the Cal Poly Pomona chapter of the American Institute of Industrial Engineers. Eligible students may be invited to join the departmentally sponsored chapter of Alpha Pi Mu, the national industrial engineering honor society. There are also student chapters of the American Foundrymen's Society and the Society of Manufacturing Engineers.

CORE COURSES FOR MAJOR

(Required of all students)

Process Design	IE	128	(4)
Work Analysis and Design	IE	224	(4)
Work Analysis and Design	IE	225	(4)
Indus Engr Math Anal	IE	311	(4)
Ele of Ind Engr Sys	IE	327	(4)
Facilities Planning, Layout & Design	IE	331	(4)
Operations Planning and Control	IE	336	(3)
Intro to Oper Reseach	IE	416	(4)
Intro to Oper Research	IE	417	(4)
Industrial System Design	IE	429	(4)
Industrial Engr electives*			(6)
Industrial & Manufacturing Engineering Fund	IME	111	(4)
Production Plng and Control	IME	236	(3)
Indus Costs and Controls	IME	239	(5)
Quality Control by Stat Met	IME	415	(4)
Industrial Computer Sys	IME	428	(4)
Senior Project	IME	461	(2)
Senior Project	IME	462	(2)

*Select with advisor's approval.

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Life Science	BIO	110	(3)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Lab	CHM	151	(1)
General Chemistry Lab	CHM	152	(1)
Report Writing	COM	216	(4)
Principles of Economics	EC	201	(4)
Elements of Elec Engr	ECE	231	(4)
Elect Inst & Contr	ECE	333	(4)
Freshman Composition	ENG	104	(4)
Engineering Economy	IE	425	(4)
Undergraduate Seminar	IE	463	(2)
Anal Geometry & Calculus	MAT	114	(3)
Anal Geometry & Calculus	MAT	115	(3)
Anal Geometry & Calculus	MAT	116	(4)
Calc of Several Variables	MAT	214	(4)
Calc of Several Variables	MAT	215	(4)
Diff Equations	MAT	316	(4)
Stat Methods in Engr	STA	309	(3)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Strength of Materials	ME	218	(3)
Strength of Materials	ME	219	(3)
Engineering Design Graphics	MFE	121	(2)
Materials Science and Engr	MTE	207	(3)

General Physics	PHY	131	(13)
General Physics	PHY	132	(13)
General Physics	PHY	133	(13)
General Physics lab	PHY	151	(1)
General Physics lab	PHY	152	(2)
General Physics lab	PHY	153	(3)
Principles of Psychology	PSY	201	(4)
Eng Science Electives*			(10)
Upper Division Science G.E.*			(3)
ART/LIT/PHL Electives *#			(8)
SOC/POL/HST Electives *#			(4)

* Select with advisor's approval.
*# Must be taken from General Education list.

Manufacturing Engineering

Manufacturing engineers are involved with manufacturing equipment, processes, and operations. They do not treat these areas separately, but consider them together as systems. The design, development, and technical management of manufacturing systems requires a knowledge of mathematical, physical, and social sciences. The application of such scientific knowledge requires skill in engineering design.

At Cal Poly, Pomona the skills needed for the practice of manufacturing engineering are developed through study and practice in the classroom and are reinforced by experience in the laboratory and shop. There is a strong laboratory emphasis. Large, well-equipped labs are available for etched circuit wiring fabrication, forming and assembly, machine operations, molding and casting, metrology, plastics and wood processing, and plating.

Manufacturing engineers are hired by companies of all sizes. In large firms they may specialize in one or more of the following areas: method development; tool, equipment, and assembly design; cost estimation and reduction; administration; material, equipment, and services purchasing; plant layout; and numerical and computer control operations. In small and medium-sized firms the manufacturing engineer is likely to have a more uniform exposure to all areas.

Manufacturing engineering students are encouraged to join the Cal Poly chapter of the Society of Manufacturing Engineers. There are also student chapters of the American Foundryman's Society and the American Institute of Industrial Engineers.

CORE COURSES FOR MAJOR

(Required of all students)

Work Analysis and Design	IE	224	(4)
Facilities Planning, Layout & Design	IE	331	(4)
Industrial and Manufacturing Engineering Fund	IME	111	(4)
Molding and Casting	IME	134	(2)
Process Design	IME	228	(2)
Production Planning and Control	IME	236	(3)
Industrial Costs and Controls	IME	239	(5)
Quality Control by Statistical Methods	IME	415	(4)
Senior Project	IME	461	(2)
Senior Project	IME	462	(2)
Engineering Design Graphics	MFE	121	(2)
Advanced Engineering Design Graphics	MFE	122	(2)
Manufacturing Processes-Metal Removal	MFE	221	(2)
Manufacturing Processes-Form & Assembly	MFE	230	(2)
Production Engineering	MFE	324	(3)
Production Engineering	MFE	325	(3)
Manufacturing Processes-Numerical Control	MFE	327	(2)
Manufacturing Metrology	MFE	380	(2)
Manufacturing Operations Analysis	MFE	421	(3)
Advanced Process Design	MFE	484	(3)
Manufacturing Engineering Electives	*		(7)

* Select with advisor's approval.

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Lab	CHM	151	(1)
General Chemistry Lab	CHM	152	(1)
Report Writing	COM	216	(4)
Principles of Economics	EC	201	(4)
Elements of Electrical Engineering	ECE	231	(4)
Electronic Instrumentation & Controls	ECE	333	(4)
Freshman Composition	ENG	104	(4)
Engineering Economy	IE	425	(4)
Analytical Geometry & Calculus	MAT	114	(3)
Analytical Geometry & Calculus	MAT	115	(3)
Analytical Geometry & Calculus	MAT	116	(4)
Calculus of Several Variables	MAT	214	(4)
Calculus of Several Variables	MAT	215	(4)
Differential Equations	MAT	316	(4)
Statistical Methods in Engineering	STA	309	(3)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Strength of Materials	ME	218	(3)
Strength of Materials	ME	219	(3)
Introduction to Mechanical Design	ME	233	(4)
Thermodynamics	ME	301	(4)
Fluid Mechanics	ME	311	(3)
Stress Analysis	ME	319	(4)
Undergraduate Seminar	MFE	463	(2)
Materials Science and Engineering	MTE	207	(3)
Materials Joining	MTE	337	(3)
General Physics	PHY	131	(13)
General Physics	PHY	132	(13)
General Physics	PHY	133	(13)
General Physics lab	PHY	151	(1)
General Physics lab	PHY	152	(1)
General Physics lab	PHY	153	(1)
Principles of Psychology	PSY	201	(4)
Upper Division Science G.E.*			(3)
Life Sci. Elective*			(3)
ART/LIT/PHL Elective*#			(8)
SOC/POL/HST Elective*#			(4)

* Select with advisor's approval.
*# Selected from G.E. list.

Course Descriptions

IE 128 Process Design (4)

Development of the methods of manufacture and product design so that the product can be produced at a competitive price. Evaluation of alternative methods of processing relative to delivery, volume, and quality specifications. Capabilities and limitations of commonly used industrial processes. 3 lectures, 1 three-hour laboratory.

IE 214 Industrial Incentives (3)

Types of incentives used in industry. Individual and group incentive plans, bonus plans, and suggestion systems. 3 lectures. Prerequisite: IE 224.

IE 224, 225 Work Analysis and Design (4) (4)

Theory and application of work analysis as related to process design, facilities, work place layout, tools and equipment and services. Analytical techniques of measurement of work content including stopwatch time study, micro-motion study, predetermined time systems, and work sampling. Survey of man's psychological and physiological characteristics and how they influence engineering and design of machines and man-machine systems. 3 lectures, 1 three-hour laboratory.

IE 311 Industrial Engineering Mathematical Analysis (4)

Application of linear equations, matrices, determinants, probability, and statistics to the solution of industrial engineering problems. Planning and analyzing engineering systems to collect and interpret statistical data. Mathematical analysis of the results of changing operating parameters to improve quality and reduce cost. 4 lectures. Prerequisite: STA 309 or consent of instructor.

IE 327 Elements of Industrial Engineering Systems (4)

Concepts and principles of system engineering theory as related to the large scale human system problem. Introduction to the theory and methodology of the engineering system. Development of analytic techniques to establish needs, objectives, priorities and utilities, and the evaluation of system effectiveness. 3 lectures, 1 three-hour laboratory. Prerequisite: MAT 116, STA 309, IE 311 or consent of instructor.

IE 331 Facilities Planning, Layout and Design (4)

Planning and designing facilities, layouts, and material handling systems. Systems engineering approach; quantitative analysis methods; computerized techniques. Projects. 3 lectures, 1 three-hour laboratory. Prerequisites: IE 128, IME 236. STA 309 recommended.

IE 336 Operations Planning and Control (3)

Concepts of planning, scheduling, and controlling integrated operations. Mathematical and computer models of production, inventory, and service systems. Design of cost effective planning and control systems. Projects. 2 lectures. 1 three-hour laboratory. Prerequisites: IME 236, IE 327, STA 309, 4 quarter units of industrial or manufacturing systems courses.

IE 403 Engineering Cost Estimating (3)

Concepts and techniques of forecasting and estimating costs of engineering, manufacturing and service operations, products, equipment, projects and systems. Preliminary and detailed procedures. Qualitative, quantitative and computer methods. 3 lectures. Prerequisite: Junior standing in engineering courses.

IE 405 Engineering Economy (3)

Economic decision making for engineering projects and capital expenditures proposals. Concepts of time value of money, cash flow and capital rationing. Basic comparative models for evaluating alternatives. Sensitivity and probability analyses; depreciation and tax consequences; replacement studies; consideration of intangibles. 3 lectures. Prerequisite: Junior standing in engineering courses.

IE 416 Introduction to Operations Research (4)

Application of statistical methods, linear programming, queuing and other analysis techniques to problems encountered in industry. 4 lectures. Prerequisites: IE 311, STA 309.

IE 417 Introduction to Operations Research (4)

Development and application of planning and inventory models, network techniques, Markov analysis, waiting lines, simulation and scheduling algorithms to problems encountered in industry. 4 lectures. Prerequisite: IE 416.

IE 419 Reliability Concepts and Techniques (3)

Reliability concepts and techniques as they are used in various types of industrial organizations. Analysis of the influence of reliability on such factors as complexity, state of the art, environment and workmanship. Component reliability related to systems requirements. 3 lectures. Prerequisite: IME 415.

IE 425 Engineering Economy (4)

Engineering economic analysis of projects and capital expenditures. Concepts of time value of money; cash flow; capital rationing; and selection of minimum rate of return. Structural analysis of alternatives; replacement analysis, analysis of public projects; sensitivity analysis, probability concepts applied to analysis; effects of inflation and tax consequences. 4 lectures. Prerequisites: Junior standing in engineering courses.

IE 426 Applied Decision Theory (3)

Introduction to decision theory and its applications. Modern utility theory and its application to decision making under risk. Applications of Bayesian decision theory. Emphasis of applications covering wide range of both profit and nonprofit oriented institutions. 3 lectures. Prerequisite: STA 309 or equivalent.

IE 429 Industrial Systems Design (4)

Systems analysis, design and measurement. Data gathering and analytical tools used in formulating and optimizing work systems. Theory of systems concepts based on logical synthesis and empirical analysis. Case studies and industrial simulations. 3 lectures, 1 three-hour laboratory. Prerequisites: IE 327, IME 428, STA 309.

IE 437 Industrial Engineering Systems (3)

Application of the concepts of systems engineering methodology of the large scale problem. Methods of technological forecasting and futures study. The design and analysis of systems under conditions of long-term uncertainty and variability in the system environment. 3 lectures. Prerequisite: IE 327.

IE 446 Die Casting (2)

Principles and techniques of hot chamber and cold chamber die casting. Comparison of the relative economy of die casting with other methods of manufacturing the same parts. Fundamentals of die design and construction. 1 lecture, 1 three-hour laboratory. Prerequisite: IME 134.

IE 463 Undergraduate Seminar (2)

Preparation, oral presentaion, and discussion by students of technical papers on recent enginering developments. 2 lectures. Prerequisite: Senior standing.

IME 111 Industrial and Manufacturing Engineering Fundamentals (4)

Introduction to industrial and manufacturing engineering concepts, functions and techniques. Fundamentals of digital computer methods; logic diagramming; programming in a high level language. Solution of elementary industrial and manufacturing engineering problems. 3 lectures, 1 three-hour laboratory.

IME 134 Molding and Casting (2)

Shaping of metals while in the liquid state; common molding and casting techniques for both ferrous and non-ferrous materials and alloys. 1 lecture, 1 three-hour laboratory.

IME 228 Process Design (2)

Design of manufacturing processes with particular emphasis on processes used in the electronics industry. Evaluation of alternative methods of processing depending upon delivery, volume, and quality specifications. Types of processes included are finishing, plating printed circuit making, component preparation and installation, chassis construction, electroforming, and packaging. 1 lecture, 1 three-hour laboratory. Prerequisite: basic electronic and drafting courses or consent of instructor.

IME 236 Production Planning and Control (3)

Principles of planning and controlling manufacturing activities. Product development, forecasting, scheduling and loading, process planning and routing, materials planning and control, dispatching, progress reporting, and corrective action. Quantitative methods. 3 lectures. Prerquisite: IME 111 or consent of instructor.

IME 239 Industrial Costs and Controls (5)

Engineering approach to cost recording, budgetary procedures and controls. Estimating production costs. Engineering problems used to teach fundamentals. Current techniques in mechanizing the cost recording and cost control functions. 3 lectures, 2 three-hour laboratories.

IME 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

IME 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

IME 415 Quality Control by Statistical Methods (4)

Systems of inspection, analysis and action taken to control manufacturing processes. Process control techniques, acceptance sampling methods statistical analysis and other techniques used by management to control costs and improve quality. 4 lectures. Prerequisite: STA 309.

IME 428 Industrial Computer Systems (4)

Provides basic familiarity with digital and analog computers. How computers function and the range of industrial applications for which they are appropriate. Integration, evaluation, and design of computer-centered systems. 2 lectures, 2 three-hour laboratories. Prerequisite: Junior standing, computer programming course.

IME 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

IME 499 Special topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

MFE 121 Engineering Design Graphics (2)

Functional graphic communication of engineering information including projection theory, sectional and auxiliary views, dimensioning, tolerancing, fastening devices, drawings for typical manufacturing methods, current drafting materials and practices. 2 three-hour laboratories.

MFE 122 Advanced Engineering Design Graphics (2)

Continuation of Engineering Graphics. Emphasis placed upon theory of orthographic projection, freehand sketching, threads and fastener specification, dimensioning and working drawings. 2 three-hour laboratories. Prerequisite: MFE 121.

MFE 125 Descriptive Geometry (2)

Study of spatial geometric relationships between lines and planes. Graphical solution of common problems encountered in descriptive engineering expression. 2 three-hour laboratories. Prerequisite: MFE 121 or consent of instructor.

MFE 201 Manufacturing Processes—System Overview (4)

A comprehensive study considering the possibilities and limitations of materials, methods, machine tools, processes, operations, procedures, and techniques of production as an optimum system of relationships necessary for the creation of a product in the field of manufacturing. 4 lectures.

MFE 210 Computer-Aided Drafting (2)

Application of the digital computer and plotter to engineering drafting. 2 three-hour laboratories. Prerequisite: MFE 121, or consent of instructor.

MFE 221 Manufacturing Processes—Metal Removal (2)

An introduction to science of metal removal and the physics of metal cutting as related to cutting tool geometry, material being cut and machine tool being used. Consideration of machine speeds, feeds, tolerances and surface finish determinates as related to both manually and numerically controlled machines. 1-hour lecture, 1-three hour laboratory.

MFE 222 Manufacturing Processes—Tool Selection (2)

Machine tools referenced to the study of cutting tool geometry, tool materials, cutting forces, feed, speed, surface finish, horsepower requirements, capacity, capability, efficiency, coolants, vibration, and machine tool evaluation with computer applications. 1 lecture, 1 three-hour laboratory. Prerequisite: MFE 221, or consent of instructor.

MFE 230 Manufacturing Processes—Forming and Assembling (2)

Theory of processes and operations employing pressure and temperature to shape metals by utilizing its plastic qualities. Sheet metal and press-workings are used in research, design and manufacture of a marketable product. Emphasis is placed upon analysis and synthesis of the problem-solving processes. 1-hour lecture; 1 three-hour laboratory.

MFE 246 Graphics for Electronics (2)

Principles and technique for design and drafting of printed circuit and integrated circuit electronic packaging systems. Design considerations, problems, practices are evaluated in the development and adaptation of electronic circuits and artwork for electronic and electrical printed circuit production processes. 2 three-hour laboratories. Prerequisite: Basic electronic and drafting courses or consent of instructor.

MFE 324 Production Engineering (3)

Review of the principles of design as applied to a product. Product redesign based on the use of cost analysis and value engineering principles. The design and development of a detailed plan. Selection of production processes, sequence of operations, equipment facilities, methods, tool plans, and requirements. 2 lectures, 1 three-hour laboratory. Prerequisite: MFE 121, IME 236 or equivalent.

MFE 325 Production Engineering (3)

Designing the required tools—jigs, fixtures, dies, special purpose tools, and numerical control programs—required to provide economy and the quality of manufacturing required. Designing tools for automated manufacturing processes, integrated methods, transfer mechanisms, etc. Design of production accessories, electromechanical tooling devices. Review of tool manufacturing techniques. 2 lectures, 1 three-hour laboratory. Prerequisite: MFE 324 or equivalent.

MFE 327 Manufacturing Processes—Numerical Control (2)

Theory and application on the control of machines and manufacturing processes through the utilization of computers and numerical control (N/C) systems. Course will relate manufacturing processes to the manual and computer assisted programming of N/C systems, the course will emphasize the influence of N/C systems on the engineering producability of manufactured products. 1 lecture, 1 three-hour laboratory. Prerequisite: Course in computer programming, MFE 222 or equivalent experience.

MFE 380 Manufacturing Metrology (2)

The science of engineering measurement as used in inspection and quality control. Emphasis will be placed upon the general use of scientific measuring devices and how these devices can be used to secure optimal conditions of manufacture. 1 lecture, 1 three-hour laboratory.

MFE 385 Numerical Control (2)

Advanced numerical control systems including positioning and contouring metal cutting machines. Application of numerical control to industrial manufacturing processes, including computer-aided manufacturing. 1 lecture, 1 three-hour laboratory. Prerequisite: MFE 327.

MFE 406 Safety Management (3)

An introduction to essential elements involved in establishing a safety management program in the manufacturing enterprise. Worker, supervisor, management, and administrative contribution to the program will be discussed. 3 lectures. Prerequisite: Senior standing.

MFE 410 Computer Aided Design (2)

Introduction to interactive computer graphics systems with emphasis on its application to the use in engineering design. 1 lecture, 1-three hour laboratory. Prerequisites: Course in computer programming, MFE 121, MFE 210; or consent of instructor.

MFE 411 Manufacturing Processes—Finishing (2)

A comprehensive overview of the possibilities and limitations of finishing processes for both metallic and non-metallic materials. Consideration of cleaning methods, surface conditioning, and coating processes as related to obtaining high-quality products and reduced manufacturing costs. 1 lecture, 1 three-hour laboratory. Prerequisite: MFE 221 and MFE 230, or consent of instructor.

MFE 421 Manufacturing Operations Analysis (3)

Theories of processing and an analysis of cost estimates to determine feasibility of manufacture under differing sets of industrial conditions. 3 lectures. Prerequisite: Senior standing.

MFE 427 Computer Programming of N/C Machines (4)

Advanced numerical control (N/C) programming including design of machine control systems, N/C, machine tools and their components. Application of computer aided N/C, programming methods to curve fitting, analytic and sculptured surfaces. Laboratory experiments on the programming and operation of N/C machine tools. 3 lectures, 1 three-hour laboratory. Prerequisite: MFE 327.

MFE 430 Manufacturing Cost Estimation (3)

A study of cost estimation of modern manufacturing based upon processing analysis. The role, function and use of various types of estimates is discussed. 3 lectures. Prerequisite: Senior standing, or consent of instructor.

MFE 438 Manufacturing Processes—Non-Metallic (3)

An investigation of non-metallic plastic materials, their sources, and polymer combination. Overview of organic chemistry as it relates to plastics polymer chemistry. Plastic formulas, mixing characteristics, flow characteristics, stability and additives are studied. Basic plastic polymers are studied indepth—both thermosetting and thermoplastic resins. 2 lectures, 1 three-hour laboratory.

MFE 439 Manufacturing Processes—Non-Metallic (3)

A study of non-metallic plastic processing techniques. Coatings, laminations, machining, compression, transfer, injection, extrusion, vacuum, blow molding and casting processes are studied. An analysis of the major production techniques for thermoset and thermoplastic resin processes. 2 lecture, 1-three hour laboratory.

MFE 440 Manufacturing Processes—Non-Metallic testing Procedures (Plastics) (3)

Concepts of destructive and non-destructive testing procedures for plastics resins and finished products. Material mixing, flow characteristics, stability of resins and polymers, ASTM test procedures, NEMA test procedures, MIL test, proprietary and custom testing to material failure. Study of mechanical, electrical thermal and chemical properties of plastic resins and composites. 2 lectures, 1-three hour laboratory. Prerequisite: MTE 207

MFE 441 Manufacturing Processes—Non-Metallic, Injection/Extrusion Molding (3)

An in-depth study of plastic injection and extrusion molding manufacturing processes and machines in the plastics industry. Machine design, mold design, die design, gating and venting systems, hydraulic systems, screw design, heating and cooling systems are studied and evaluated. 2 lectures, 1-three hour laboratory. Prerequisite: MFE 438

MFE 463 Undergraduate Seminar (2)

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments. 2 lectures. Prerequisite: Senior standing.

MFE 470 Computer-Aided Manufacturing (3)

A synthesis of computer utilization inmanufacturing engineering. N/C automation, cybernetics, data systems, CAD/CAM, and computer simulation. 2 lectures, 1 three-hour laboratory. Prerequisite: ETT 110, MFE 327.

MFE 484 Advanced Processes Design (3)

Analysis and design of custom equipment to produce specific piece parts on a systems basis. Industrial problems will be assigned to enhance the concepts involved. 3 lectures. Prerequisite: Junior standing in engineering courses.

MFE 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

MECHANICAL ENGINEERING

Kenneth J. Schneider, *Chair*

Robert L. Beardmore
Leonard Berkowitz
John R. Biddle
Douglas C. Dowell
George F. Engelke
James D. Goodin
Gary W. Koonce
Alfred E. Noreen
Carl E. Rathmann
John A. Seevers
Michael T. Shelton
Richard F. Sholtis, Jr.
Edwin H. Williams
Darryl C. Zell

Mechanical engineering has traditionally been one of the most general branches of engineering. A mechanical engineer requires a broad knowledge in many fields—mechanics, thermal science, design, machinery and instrumentation, and many more. The breadth and flexibility of a mechanical engineer's education provides a wide choice of careers and allows movement into a variety of engineering areas to better meet the challenges of a changing world. The mechanical engineering curriculum permits students to explore different fields, specializing in one or more of them as they find their true interests. Many technical elective courses are available both for specialization and for exploring individual interests. Option programs in petroleum engineering, energy systems engineering and mechanical engineering are available under the degree major.

Mechanical engineers work in industry, business, government, universities, and in the professions of law and medicine. They are involved in research, development, design, testing, production, operation, maintenance, marketing, sales, administration, and management.

During the junior and senior years students may choose approved electives in any recognized engineering discipline or in any area related to engineering practice.

The department offers technical electives in the areas of advanced machine design, energy systems engineering, solar engineering, petroleum engineering, thermo-fluids engineering and advanced mechanics. Principles developed in the classroom are applied to the operation and testing of heat transfer equipment, fluid handling equipment, energy systems, petroleum engineering equipment, environmental control systems, internal and external combustion engines and engineering materials.

The high school student preparing for a career in mechanical engineering should take a balanced high school program including mathematics, physical sciences and drafting. It is now possible for the community college transfer to complete a B.S. degree at Cal Poly in six quarters (four semesters) after transferring. The community college student planning to transfer into this department should obtain a copy of the community college transfer curriculum for a B.S. in mechanical engineering at Cal Poly by consulting a school counselor or contacting the department at Cal Poly concerning courses which meet the accredited program requirements of the Accreditation Board for Engineering and Technology.

An active co-curricular program includes a chapter of Pi Tau Sigma, national mechanical engineering honorary fraternity; and student sections of the American Society of Mechanical Engineers and the Society of Automotive Engineers.

CORE COURSES FOR MAJOR

(Required of all students)

Mechanical Engineering Orientation	ME	100	(1)
Engr Digital Computations	ME	132	(3)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Strength of Materials	ME	218	(3)
Strength of Materials	ME	219	(3)
Intro to Mechanical Design	ME	233	(4)
Thermodynamics	ME	301	(4)
Thermodynamics	ME	302	(4)
Fluid Mechanics	ME	311	(3)
Fluid Mechanics	ME	312	(4)
Heat Transfer	ME	313	(4)
Engineering Materials	ME	315	(3)
Stress Analysis	ME	319	(4)
Engr. Num. Computations	ME	330	(4)
Materials Design Lab	ME	350	(1)
Mechanical Vibrations	ME	413	(4)
Adv Engineering Meas	ME	435	(3)
Senior Project	ME	461	(2)
Senior Project	ME	462	(2)
Undergraduate Seminar	ME	463	(2)

OPTION COURSES FOR MAJOR

(Required for Specific Option)

Energy Systems Engineering Option

Energy Management	ME	306	(4)
Alternative Energy Systems	ME	406	(4)
Technical Electives selected from the following courses:			(20)
Solar Thermal Engineering	ME	407	(4)
Nuclear Engineering	ME	408	(4)
Heat Power	ME	411	(4)
Internal Combustion Engines	ME	412	(4)
Air Conditioning	ME	417	(4)
Air Conditioning	ME	418	(4)
Free Technical Elective			(1)

Mechanical Engineering Option

Vector Dynamics	ME	316	(3)
Machine Design	ME	325	(4)
Technical Electives (At least 4 units must be in ME Department)			(15)
Manufacturing Processes	MFE	221	(2)
Manufacturing Processes	MFE	230	(2)
Weld. Fabr. & Design	MTE	337	(3)

Petroleum Engineering Option

Physical Geology	ESC	111	(4)

Intro to Petroleum Engineering	ME	101	(1)
Energy Management	ME	306	(4)
Petroleum Design Engineering	ME	327	(4)
Petroleum Development Engineering	ME	401	(4)
Petroleum Reservoir Engineering	ME	402	(4)
Petroleum Production Engineering	ME	403	(4)
Chemical Applications to Petroleum Engineering	CHE	380	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Lab	CHM	151	(1)
General Chemistry Lab	CHM	152	(1)
Principles of Economics	EC	201	(4)
or Prin of Econ	EC	202	
Elem of Elec Engr	ECE	231	(4)
Electric Machines	ECE	313	(3)
Elec Instr & Control	ECE	333	(4)
Freshman Composition	ENG	104	(4)
Petroleum Geology*	ESC	351	(3)
Engineering Economy	IE	425	(4)
Analytic Geom & Calculus	MAT	114	(3)
Analytic Geom & Calculus	MAT	115	(3)
Analytic Geom & Calculus	MAT	116	(4)
Calc of Several Variables	MAT	214	(4)
Calc & Several Variables	MAT	215	(4)
Differential Equations	MAT	316	(4)
Mech. Engr. Communications	ME	231	(4)
or Adv. Prof. Writing	ENG	301	(4)
Engineering Design Graphics	MFE	121	(2)
Advanced Engineering Design Graphics	MFE	122	(2)
General Physics	PHY	131	(3)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Physics lab	PHY	151	(1)
General Physics lab	PHY	152	(1)
General Physics lab	PHY	153	(1)
General Psychology	PSY	201	(4)
Life Science	BIO	110	(3)
HUM/SOC/POL Elective			(4)
ART/LIT/PHL Elective			(8)
Basic Sc. Elective (300–400 level)**			(4)

* Applies only to Petroleum Engr. Option U.D.G.E.

** Applies only to ME and Energy Systems Options

Course Descriptions

ME 100 Mechanical Engineering Orientation (1)

Introduction to the resources and facilities of the mechanical engineering department. An overview of career opportunities and introspection about mechanical engineering. Various forms of engineering communication including report writing, graphical presentations and problem-solving format. Becoming conversant with unit systems and dimensional analysis. 1 three-hour laboratory.

ME 101 Introduction to Petroleum Engineering (1)

Lecture-discussion, movies, speakers and field trips are utilized to illustrate terminology, practices and career opportunities in the petroleum and energy areas for the mechanical engineer. 1 three-hour laboratory.

ME 132 Engineering Digital Computations (3)

Problems involving basic computational methods including elementary concepts of digital computer programming. Proficiency will be gained in writing computer programs using fortran. Assignments include the use of the computer facilities. 2 lectures, 1 three-hour laboratory.

ME 214 Vector Statics (3)

Two and three dimensional equilibium of frames, machine and trusses employing vector algebra. Principles of friction, centroids and center of gravity, moments of inertia for areas and masses. 3 lectures. Prerequisites: PHY 131, MAT 116 concurrent.

ME 215 Vector Dynamics (4)

Vector mathematics of absolute and relative motion of particles and rigid bodies in translating and rotating reference frames. Newton's laws of motion, work-energy, impulse-momentum. 4 lectures. Prerequisite: ME 214, Math 214 concurrent.

ME 218 Strengths of Materials (3)

Plane stress and strain. Principal stresses and strains, Mohr's Circle. Properties of materials, stress strain diagrams. Generalized Hooke's Law for isotropic materials. Design loads, working stresses, and factor of safety. Statically indeterminant axially loaded members. Torsional shearing stresses and displacements. Combined axial and torsional loads. Flexural and transverse shear stresses. Shear and moment diagrams. Beams of two materials. Thin-walled pressure vessels. 3 lectures. Prerequisites: ME 214 and MAT 116.

ME 219 Strength of Materials (3)

Deflection and slope of beams by double integration, singularity function, area-moment, superposition and Castigliano's theorem. Statically indeterminate beams. Column analysis—centric and eccentric loading. Commercial and standard tests of materials. Experimental stress analysis—strain gauges and photoelasticity. 2 lectures, 1 three-hour laboratory. Prerequisites: ME 218, ENG 104. Corequisite: ME 231 or CE 361 or ENG 301.

ME 231 Mechanical Engineering Communications (4)

The mechanics of effective engineering communications. Composition and style of various types of written and oral presentations of technical information. Critical analysis of specifications related to the design, test and performance of components and systems typically found in the field of mechanical engineering. 4 lectures. Prerequisite: ENG 104, ME 218.

ME 233 Introduction to Mechanical Design (4)

Introduction to machine and product design techniques and the design and selection of power transmission elements such as couplings; U-joints; roller and silent chains; V, flat and gear belts; gears and gear transmissions; cams, and friction drives. Introduction to shaft design, bearings and attachments. The execution of layouts and engineering specifications for manufacture. 3 lectures, 1 three-hour laboratory. Prerequisite: MFE 122.

ME 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ME 301 Thermodynamics (4)

Thermodynamics properties and processes; equations of state; tables and charts of thermodynamic properties; work and heat, the first law of thermodynamics and first law properties; the second law of thermodynamics and entropy; power cycles, 4 lectures. Prerequisites: PHY 132.

ME 302 Thermodynamics (4)

Availability; Rankine cycle and its variations; refrigeration cycles; mixtures of ideal gases; Maxwell relations; thermodynamic properties for real gases. 4 lectures. Prerequisite: ME 301, MAT 215.

ME 306 Energy Management (4)

Energy system modeling; forecasting techniques; analysis of energy requirements; energy audits; net energy analysis; conservation strategies; energy, environment and economics interface; role of energy management and case studies. 4 lectures. Prerequisite: ME 301 or equivalent.

ME 311 Fluid Mechanics (3)

Analysis and problems dealing with properties and behavior of fluids at rest and in motion. Fundamental concepts; fluid statics; transport theorem; flow of incompressible frictionless fluid; laminar and turbulent flow of real fluids in closed conduits; impulse and momentum applied to fluids; fluid measurement. 3 lectures. Prerequisites: ME 215 and PHY 132; concurrent MAT 215.

ME 312 Fluid Mechanics (4)

Similarity and dimensional analysis; steady closed conduit flow in pipe networks; flow of real compressible fluids; additional topics selected from boundary layers, turbulence, drag and dynamic machinery. 3 lectures, 1 three-hour laboratory. Prerequisite: ME 301, ME 311. Corequisite: ME 231.

ME 313 Heat Transfer (4)

Basic principles of conduction, convection, and radiation heat transfer. One-dimensional and multi-dimensional conduction, steady and unsteady state. Theoretical and empirical relations for free and forced convection in external surface flows and in tube and duct flows. Heat exchangers. Basic laws of radiation heat transfer, radiation properties of surfaces and radiant energy exchange among simple surfaces. 4 lectures. Prerequisite: ME 301, ME 312, MAT 316.

ME 315 Engineering Materials (3)

Relevance of materials science concepts in engineering. Metallurgy and strengthening methods for ferrous and non-ferrous metals. Engineering properties and applications of metals, plastics, ceramics, glasses, elastomers, and composites. Principles of corrosion protection. Recent advances in engineering materials. 3 lectures. Prerequisite: CHM 112.

ME 316 Vector Dynamics (3)

Two and three dimensional dynamics of rigid bodies. Moments and products of inertia. Rotating axis theorem. Linear and angular momentum. Gyroscopes. 3 lectures. Prerequisite: ME 215.

ME 319 Stress Analysis (4)

Fundamentals of elasticity. Combined stresses from machine loads. Theories of failure. Stress concentration determination and reduction. Repeated loading fatigue, endurance strength. Connections, joints, and springs. Beam analysis. Introduction to plate analysis. Thick-walled pressure vessels. 4 lectures. Prerequisite: ME 219.

ME 320 Creativity (3)

A class to improve the student's creative ability and output. Stiflers are studied and ways to overcome them are applied. Known creative techniques and exercises are performed both individually and in groups. Methods of protecting and selling ideas or inventions are presented. Two 2-hour lectures. Prerequisite: Junior Standing.

ME 325 Machine Design (4)

Design and application of machine components such as brakes, clutches, gears, mechanisms, bearings, ways, sleeves, and bushings. Lubrication of machine elements, gaskets, seals, "o" rings, and fasteners. Design techniques and the design of a simple machine. 3 lectures, 1 three-hour laboratory. Prerequisites: ME 215, ME 233, ME 319, MFE 221, MFE 222 or 230.

ME 326 Machine Design (4)

The emphasis of this course will be placed on the actual process of design. Lectures and laboratories will be devoted to the design of a complete and complex automatic assembly, inspection or manufacturing machine. The projects are so chosen as to demand the application of knowledge learned in other courses and act as a synthesizing agent. Real industrial problems are used as projects. 2 one-hour lectures, 2 three-hour laboratories. Prerequisite: ME 325.

ME 327 Petroleum Engineering Design (4)

Design of machine components and surface facilities; selection of pumps, pulsation dampeners, valves, filters and oil-water separation systems. Design of a complete system using compatible components. Design problems related to reservoir development, optimum well spacing and well completion. 3 lectures, 1 three-hour laboratory. Prerequisites: ME 101, ME 215, ME 233, ME 319.

ME 330 Engineering Numerical Computations (4)

Numerical methods applied to the solution of problems in engineering. Roots of equations, matrix methods, curve fitting, numerical integration and differentiation, numerical solution of differential equations. Prerequisites: MAT 316, ME 132.

ME 340 Synthesis of Mechanical Engineering Problems (3)

Analysis and synthesis of steady-state and transient engineering problems associated with mechanical engineering. Emphasis is placed upon formulating the differential or fundamental equations from basic assumptions and applying various methods of solution. 3 lectures. Prerequisite: MAT 316.

ME 350 Materials Design Laboratory (1)

Case studies in the application of materials in engineering design. The student will design various components and elements of machines with the emphasis on material selection, taking into account availability, cost, wear, stress, strain, corrosion, radiation and thermal factors. 1 three-hour laboratory. Prerequisite: ME 218. Corequisite: ME 315 or equivalent.

ME 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ME 401 Petroleum Development Engineering (4)

Composition and properties of drilling fluids and cements, rock breakage, and properties of reservoir rocks. Rock drilling mechanics including rotary drilling equipment. Well completion and analysis. Well logs and logging techniques, interpreting logging results and the effects of bed thickness, wellbore invasion, and hold rugosity. Oil recovery techniques. 4 lectures.

ME 402 Petroleum Reservoir Engineering (4)

Single and multiphase flow through porous media, Darcy's law, reservoir fluid properties. Study of volumetric and water drive reservoir systems by material balance for reservoir performance analysis. Flow and displacement dynamics associated with wells, water/gas coning, effective and skin permeabilities, driving potentials. Porous media flow equations. Wellbore damage effects. 4 lectures. Prerequisite: ME 312.

ME 403 Petroleum Production Engineering (4)

Analysis and design of well production systems, well stimulation, workover techniques, oil recovery methods, pumping practices, secondary recovery methods. Natural gas collection, treatment and storage. 4 lectures.

ME 406 Alternative Energy Systems (4)

Analysis and synthesis of energy systems; fossil fuel systems; viable alternative energy sources, solar, geothermal, and tidal; resources, conversion, storage, and distribution. Environmental impact and economics of alternative systems. Synthesis of energy system components. 3 hours lecture, 1 three-hour laboratory. Prerequisite: ME 301 or equivalent.

ME 407 Solar Thermal Engineering (4)

Analysis of flat plate and focusing solar collectors. Solar radiation distribution and measurement. Solar energy storage. Solar process models. Applications to heating and cooling systems. 4 lectures. Prerequisites: ME 312 and ME 313 or equivalent.

ME 408 Nuclear Engineering (4)

Nuclear power reactor operation. Reactor vessel internals and core components. Nuclear physics. Neutron reactions and slowing down processes. Reactor physics and reactor kinetics. 4 lectures. Prerequisites: MAT 316, PHY 133.

ME 411 Heat Power (4)

Application of the principles of thermodynamics to actual power plant cycles. Rankine cycle and its variations; boiler and steam turbine heat balance and efficiency; steam plant auxiliaries, plant heat balance and efficiency; gas turbine and combined cycles. 3 lectures, 1 three-hour laboratory. Prerequisites: ME 302, ME 311, ME 313.

ME 412 Internal Combustion Engines (4)

The development of analytical and experimental techniques to estimate the performance of internal combustion engines. Discussion includes ideal and actual cycles, combustion, carburetion, fuel injection, ignition, supercharging, cooling, and fuels as applied to spark ignition and compression ignition engines. 3 lectures, 1 three-hour laboratory. Prerequisites: ME 302, ME 313, or consent of instructor.

ME 413 Mechanical Vibrations (4)

Free and forced vibration with and without damping. Periodic and aperiodic excitation. Rotating unbalance, vibration isolation, vibration measuring instruments, vibration of several degrees of freedom. 4 lectures. Prerequisites: ME 215, MAT 316.

ME 414 Advanced Vibrations (3)

Vibration of multi-degree of freedom systems. Matrix iteration, normal coordinates, forced vibration, transfer matrices, continuous systems. 3 lectures. Prerequisite: ME 413.

ME 417 Air Conditioning (4)

Thermal environmental requirement for human habitation. Psychrometrics. Building heating and cooling loads. Air handling equipment and distribution systems. Principles of refrigeration. 4 lectures. Prerequisite: ME 302, ME 311.

ME 418 Air Conditioning (4)

Refrigeration equipment; combustion; heating equipment; air conditioning systems and their control; application of the principles of air conditioning to the design of a complete system of compatible components for the control of the thermal environment. 3 lectures and 1 three-hour laboratory. Prerequisite: ME 417.

ME 421 Dynamics of Machinery (4)

Velocity and acceleration analysis of mechanical mechanisms by analytical and graphical techniques. Determination of static and dynamic forces on machine components and linkages by combined analytical and graphical procedures. Balancing of rotating masses. Critical speeds of shafts. Analysis of gyroscopic action with applications. 3 lectures and 1 three-hour laboratory. Prerequisite: ME 316 or equivalent.

ME 435 Advanced Engineering Measurements (3)

Analysis of the generalized measurement system with application of sensing, modifying and signal read-out equipment to problems of engineering measurements. Harmonic analysis; uncertainty and error analysis. 2 lectures, 1 three-hour laboratory. Prerequisites: ME 413 and EEE 333.

ME 438 Human Engineering in Design (3)

Design of products and/or systems based on the theory of human engineering principles, study of dimensional and strength characteristics of human anatomy, capabilities and limitations of senses, responses to sensory stimuli. The application of human engineering principles or human factors in the design and mock-up of projects. 2 lectures, 1 three-hour laboratory. Prerequisite: Junior standing in engineering science, architecture or industrial.

ME 439 Design of Machine Controls (4)

Design and comparisons of hydraulic and pneumatic power systems. Control logic using Boolean algebra and truth tables. Pneumatic control circuit theory and design. Electrical control circuit theory and design. The design and programming of control circuits using microprocessors and programmable sequences. The design of control projects. Recent design developments. 2 lectures, 2 three-hour laboratories. Prerequisite: Junior standing in engineering or science.

ME 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: ME 463.

ME 463 Undergraduate Seminar (2)

New developments, policies, practices, procedures and ethics in mechanical engineering. Each student is responsible for the preparation of an approved project proposal and the development and oral presentation of a topic in the field of mechanical engineering. 2 lectures. Prerequisite: Senior standing upon completion.

ME 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ENERGY ENGINEERING MINOR

John R. Biddle, *Chair*
Mechanical Engineering
Paul A. Lord
Aerospace Engineering
A. G. Stoll
Chemical and Materials Engineering
Donald G. Wells
Civil Engineering
Alexander E. Koutras
Electrical and Computer Engineering
John D. O'Neil
Industrial and Manufacturing Engineering
George F. Engelke
Mechanical Engineering

The purpose of this minor is to provide students in the degree major programs in the School of Engineering and the Physics Department a flexible, interdisciplinary program of study in the emerging and important field of energy and in engineering. The minor is designed to encourage engineering study and applied research directed towards society's energy needs. The multidisciplinary scope of the minor includes study of all energy sources (fossil, solar, geothermal, nuclear and others), energy conversion and transfer systems, efficient energy utilization (including conservation strategies) and environmental implications.

There is an increasing need for technically qualified and informed graduates in the field of utilization and development of new sources of energy for society. Currently there are many courses in the various engineering disciplines related to this field. By bringing these courses together in a minor program the graduate will be able to emphasize this important technical area and be better able to accept meaningful technical positions in industry.

Completion of the following courses is required:

Thermodynamics	ME	301	(4)
or Chemical Engr. Thermodynamics	CHE	302	(4)
or Thermal Physics	PHY	333	(4)
Energy Management	ME	306	(4)
Alternative Energy Systems	ME	406	(4)

The remainder (12) of the 24 units required for the minor will be selected from the following list:

Atmospheric Pollution	ARO	418	(4)
Solid Waste Management	CE	457	(3)
Chemical Engineering Thermodynamics	CHE	303	(4)
Pollution Abatement	CHE	432	(3)
Ocean Engineering	ECE	430	(4)
Control Systems Engineering	ECE	309	(3)
Thermodynamics	ME	302	(4)
Solar Thermal Engineering	ME	407	(4)
Nuclear Engineering	ME	408	(4)
Physics of Environmental Problems	PHY	340	(3)
Advanced Nuclear Physics	PHY	403	(4)
Engineering Economy	IE	405	(3)
Production Engineering	MFE	324	(3)
Production Engineering	MFE	325	(3)
Industrial Systems Design	IE	429	(4)
Industrial Engineering Systems	IE	437	(3)

MATERIALS SCIENCE AND ENGINEERING MINOR

John L. Tomlinson, *Chair*
Chemical and Materials Engineering
William E. Mortensen
Aerospace Engineering
Ronald L. Carlyle
Civil Engineering
John Palmer
Electrical and Computer Engineering
John D. O'Neil
Industrial and Manufacturing Engineering
Alfred E. Noreen
Mechanical Engineering

Materials Science and Engineering is the discipline that relates the properties of materials to their structure. The School of Engineering provides a minor in Materials Science and Engineering to the student who satisfactorily completes the 24-unit requirement within his or her major curriculum. This minor is appropriate for all engineering majors.

The goal of the materials scientist is to understand and improve the properties of materials while that of the materials engineer is to apply this knowledge in the production, selection and utilization of materials. Since an engineer or scientist is called upon to work with new ideas and materials, the broadly trained graduate has a decided advantage over the narrowly trained person in ability to respond to such a challenge.

It is possible for students majoring in other engineering fields to complete the minor within the normal requirements for an engineering degree through careful advisement including authorized substitutions of certain requirements.

Requirements for the Minor

Materials Science and Engineering	MTE	207	(3)
Materials Science and Engineering Lab.	MTE	217	(1)
Physical Metallurgy-Mechanical Properties	MTE	405	(4)
Physical Metallurgy-Solidification and Strengthening Reactions	MTE	406	(4)
Technical Electives			(12)

The following courses are typical technical electives:

Aerospace Structural Mechanics	ARO	326	(4)
Aerospace Structural Mechanics	ARO	327	(4)
Structural Design—Steel	CE	406	(4)
Organic Chemistry	CHM	211	(3)
Organic Chemistry	CHM	212	(3)
Organic Chemistry	CHM	213	(3)
Polymer Chemistry	CHM	409	(3)
Intro to Colloid & Surface Chemistry	CHM	413	(3)
X-Ray Methods of Analysis	CHM	442	(4)
Corrosion Chemistry	CHM	446	(4)
Solid State Electronics	ECE	412	(4)
Integrated Circuit Design	ECE	418	(4)
Product Liability and Patents	EGR	401	(4)
Molding and Casting	IE	134	(2)
Die Casting	IE	446	(2)
Strength of Materials	ME	218	(3)
Strength of Materials	ME	219	(3)
Welding Fabrication and Design	MTE	337	(3)
Advanced Science of Materials	MTE	404	(4)

OCEAN ENGINEERING MINOR

John C. McMillan, *Chair*
Electrical and Computer Engineering
George F. Engelke
Mechanical Engineering
Robert G. Feeney
Chemical and Materials Engineering
T. Robert Kendall
Electrical and Computer Engineering
Roger Scherer
Industrial and Manufacturing Engineering
Conrad F. Newberry
Aerospace Engineering
Donald G. Wells
Civil Engineering

The opportunity is available for the engineering student to receive a minor in ocean engineering in addition to the regular B.S. degree in a particular engineering field. At present the aerospace, electrical and mechanical engineering majors can readily acquire this minor. It is possible for students majoring in other engineering fields to complete the minor within the normal requirements for an engineering degree through careful advisement including authorized substitutions of certain requirements.

The Ocean Engineering minor uses the research facilities of the CSU Ocean Studies Consortium.

The attainment of a minor in ocean engineering is accomplished by appropriate selection, timely scheduling, and satisfactory completion of certain required and elective-type courses, totaling a minimum of 24 units, as outlined below:

Completion of all the following courses is required:

Ocean Engineering	ECE	430	(4)
Underwater Electronics	ECE	434	(4)
Coastal Engineering	CE	455	(4)
Oceanography	ESC	335	(3)

Completion of at least one of the following courses (or other upper division technical elective as determined to be appropriate on a case basis) is required:

Hydronautics	ARO	410	(4)
Off-Shore Structures	ARO	415	(4)
Pressure Vessel Design	ARO	416	(4)
Control & Monitoring Systems for Undersea Work Vehicles	ECE	499	(4)
Underwater Sound	ECE	499	(4)

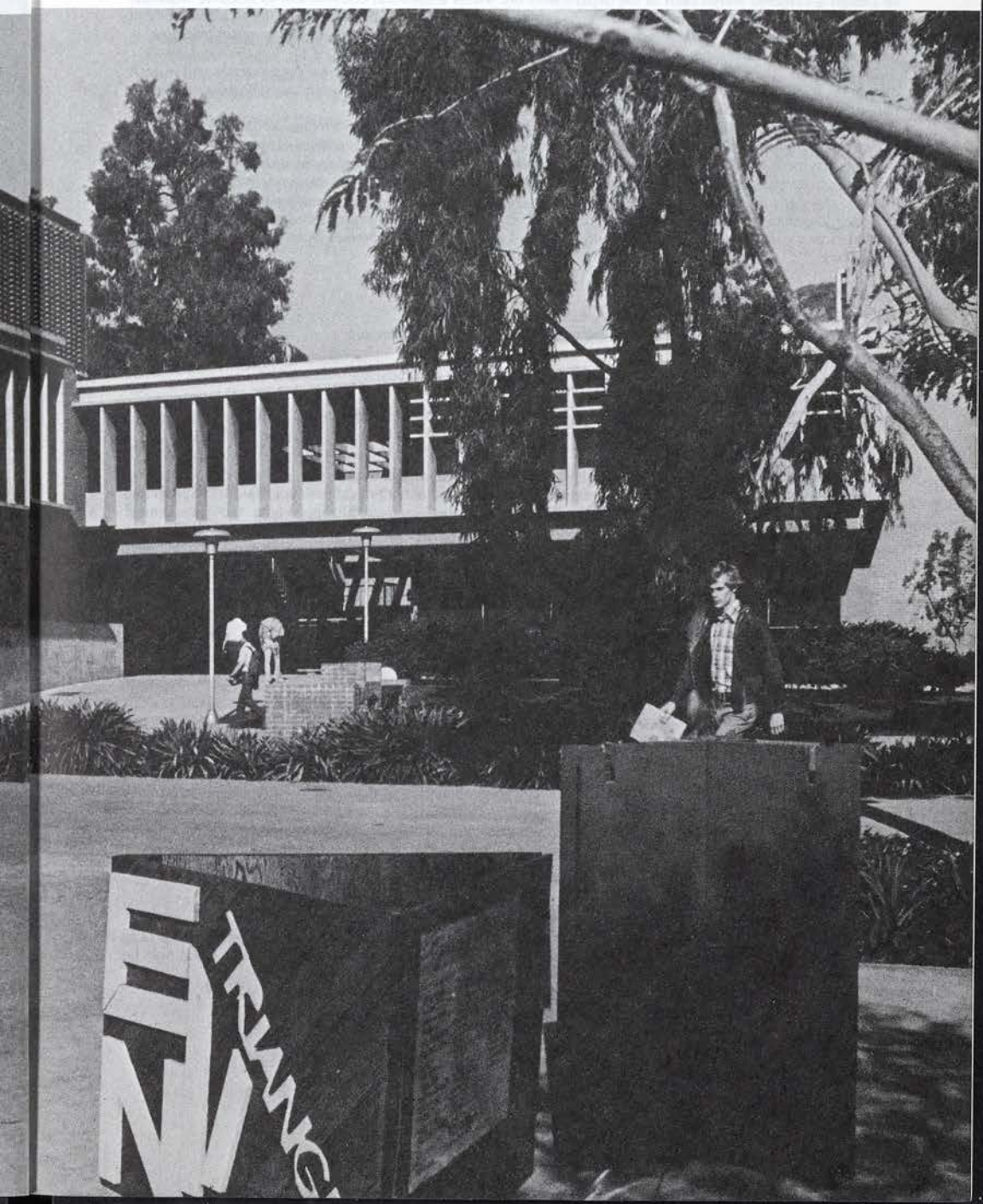
Note: Inasmuch as some of the courses are not offered every quarter, the student needs to plan overall electives accordingly to assure timely completion of all graduation requirements.

The remainder of the 24 units required for the minor may be selected from the following list:**

Hydrospace Laboratory	ARO	411	(2)
Introduction to Marine Biology	BIO	220	(3)
Marine Ecology	BIO	442	(5)
Soil Mechanics	CE	323	(3)
Corrosion Chemistry	CHM	446	(4)
Introduction to Ocean Instrumentation	ECE	230	(2)
Underwater Photography	ECE	299	(2)
Coastal Processes	ESC	338	(3)
Welding Fabrication & Design	MTE	337	(3)
Skin & Scuba Diving	PE	231	(3)

** Other appropriate technical electives may be presented to fulfill all or part of these units of the minor. These must be approved in advance by the Ocean Engineering Minor Committee as noted above.

SCHOOL OF ENVIRONMENTAL DESIGN



SCHOOL OF ENVIRONMENTAL DESIGN

Marvin J. Malecha, *Dean*

Arthur E. Hacker, *Associate Dean*

The school of Environmental Design offers comprehensive professional degree programs at the graduate and undergraduate level in Architecture, Landscape Architecture, and Urban and Regional Planning. The faculty is comprised of professionals involved in research, practice and instruction. The curricula of the School of Enviromental Design is centered within each of the departments but shares a common commitment to discover workable solutions to complex environmental concerns. As professional disciplines each department shares a commitment to the development of skills for a professional career. These skills are enriched by the support courses taken within the school and the university.

The programs offered within the school are fully accredited by the respective review organizations within each discipline. The School of Environmental Design is unique in that accredited programs are offered within each department at both the undergraduate and graduate level of instruction.

From its inception the School of Environmental Design has evolved programs which depend upon the collaborative efforts of the faculty, staff and students. This commitment to problems which address cross disciplinary issues has begun to focus the efforts of the school in its responsibilities to the student and to the professional world. The school has been organized to provide both formal and informal contacts between the departments. Shared services between the departments include student counseling, research facilities and shop equipment. Students are encouraged to participate in student organizations which combine individuals from each department. As a school dedicated to a collaborative effort the faculty, staff and students view themselves as an Environmental Design community.

Departments and Majors

ARCHITECTURE

Paul Helmle, *Acting Chair* Architecture major (BArc) Master of Architecture.

LANDSCAPE ARCHITECTURE

John T. Lyle, *Chair* Landscape Architecture major (BS) Master of Landscape Architecture

URBAN PLANNING

_____, *Chair* Urban and Regional Planning major (BS) Master of Urban and Regional Planning.

SPECIAL ADMISSIONS CRITERIA

The undergraduate program in architecture is designated as an impacted program (see earlier section of catalog on "Admissions"). In order to alleviate the pressure of impaction and to better evaluate applicants to the programs in question, a special admission policy has been adopted. Candidates interested in applying to Architecture must do so during the month of November to be considered for the following academic year. All candidates must meet regular university admission standards as well as any additional standards required by the Department of Architecture. For specific admission information, interested students should contact the School of Environmental Design Admissions and Records office.

COOPERATIVE EDUCATION

The School of Environmental Design offers a cooperative education program with business and government. The program provides for alternating periods of full-time study and full-time work or for a combination of part-time study and part-time work. Cooperative education programs may vary according to the individual student, employer and major program in the School of Environmental Design. The student's job performance is evaluated by both the work supervisor and a School of Environmental Design faculty member.

The cooperative education program offers specialized training through which the student develops a broad understanding of the role of an environmental design professional within the employer's organization as well as expanding and improving individual skills in environmental design practice. The cooperative education program may also offer the opportunity for a student to evaluate career objectives, to earn a salary while engaged in studies and to become acquainted with prospective employers.

More information may be obtained from the school of Environmental Design Admissions and Records Office and/or the university's career planning and placement officer.

COOPERATIVE EDUCATION COURSES

ENV 470, 471, 472, 473 Cooperative Education (2–4) (2–4) (2–4) (2–4)

Full-time work experience that applies environmental design principles to practice. Prerequisite: Junior standing or approval of cooperative education coordinator. Work assignment must have prior approval. Course may be repeated per student's major department limitations.

Environmental Design Courses

(For Non-Major Students:)

ENV III Living with the Land (4)

Ways of seeing, understanding and interpreting the natural and man-made landscape; basic principles of land planning and design; and the application to practical situations from private gardens to national parks. Threats to the natural landscape posed by population growth, technology and energy demands and the means available for dealing with them. 2 two-hour lectures. Not open to Landscape Architecture majors.

ENV 112 The Meaning of Architecture (4)

How buildings and architects influence our lives. Understanding the functions of architecture, including the principles of design, choice and property of materials, human needs. Exploring simple design issues through case study applications. Historic overview of architecture, progress in building technology and energy efficient materials and design, and the potential impact on the future. 2 two-hour lectures. Not open to Architecture majors.

ENV 113 Cities, Citizens and Urban Planning (4)

Factors causing changes in the city. Planning in government, private interest groups and the opportunities for citizen participation in shaping urban form. Understanding the processes of planning and design. Students will learn the roles of citizen, politician and planning official in urban growth and development and will learn how to personnally contribute to the improvement of the American urban environment. Two 2-hour lectures. Not open to UP majors.

ARCHITECTURE

Paul Helmle, *Acting Chair*

Spyros Amourgis	Margaret R. Goglia	Edward E. Pickard
Kathryn Anthony	Arthur E. Hacker	Werner Ruegger
Bertram Berensen	John F. Halldane	Dariouche Showghi
Books Cavin, III	Frederick Koeper	David R. Weaver
Richard J. Chylinski	Patricia B. Oliver	Bernard Zimmerman

The Department of Architecture, along with the departments of Landscape Architecture and Urban Planning, form the School of Environmental Design.

All coursework within the Department of Architecture is open only to those students who have been selected through the departmental admissions process and are designated as Architecture Majors.

The degree, Bachelor of Architecture, is offered in a five year curriculum which revolves about the design laboratory experience. Students begin with exercises in drawings, graphics, and visual communication and progress toward comprehensive architectural projects that employ creative and analytic skills. The program within the Department of Architecture is directed toward the realities of architectural practice and the decision-making processes as they relate to design in architecture. Designs are submitted in the form of drawings and models for review by instructors and invited guests. All work becomes the property of the department and will be retained or returned at the discretion of the instructor.

Prior to graduation, all students are required to fulfill 1,000 hours of work with a registered architect or engineer. This work must be verified by the department coordinator of Professional Practice and Cooperative Education. This work experience may be accomplished individually or through Cooperative Education courses offered in the School of Environmental Design.

The Department of Architecture is a member of the Association of Collegiate Schools of Architecture. Courses are taught by a faculty comprised of professionals engaged in both practice and education.

For information regarding the graduate program, refer to the graduate section of this catalog.

ADMISSION TO THE PROGRAM

Because the program offered by the Department of Architecture is impacted, applications are accepted only in the month of November prior to admission in the following Fall Quarter.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to Design	ARC	101	(4)
Introduction to Environmental Design	ARC	102	(4)
Introduction to Architecture	ARC	103	(4)
Architectural Design	ARC	201	(8)
Architectural Design	ARC	202	(8)
Architectural Design	ARC	203	(8)
Architectural Design	ARC	301	(8)
Architectural Design	ARC	302	(8)
Architectural Design	ARC	303	(8)
Structures	ARC	321	(4)
Structures	ARC	322	(4)
Structures	ARC	323	(4)
Environmental Controls	ARC	331	(4)
Environmental Controls	ARC	332	(4)
Ancient and Medieval Architecture	ARC	361	(4)
Renaissance and Baroque Architecture	ARC	362	(4)
Nineteenth and Twentieth Century Architecture	ARC	363	(4)
Architectural Design	ARC	401	(8)
Architectural Design	ARC	402	(8)
Architectural Design	ARC	403	(8)
Architectural Design	ARC	405	(8)
Architectural Design	ARC	406	(8)
Architectural Design	ARC	407	(8)
Seismic Design in Arch.	ARC	424	(4)
Architectural Practice	ARC	471	(4)
Intro to Hist of Land Arch	LA	121	(3)
Cities, Citizens and Urban Planning	ENV	113	(4)
Total Core Courses			155

SUPPORT AND DIRECTED COURSES

General Education

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Principles of Economics	EC	202	(4)
Freshman Composition	ENG	104	(4)
Freshman Composition	ENG	105	(4)
Advanced Professional Writing	ENG	301	(4)
College Algebra	MAT	105	(4)
Introduction to Philosophy	PHL	201	(3)
Lower Division Seminar	PHL	151	(1)
College Physics	PHY	121	(3)
College Physics	PHY	141	(1)
College Physics	PHY	122	(3)
College Physics	PHY	142	(1)
General Psychology	PSY	201	(4)
Principles of Sociology	SOC	201	(4)
or Intro to Cult.	ANT	102	
Basic Biology	BIO	115	(5)
The Visual Arts	ART	110	(4)
Advocacy & Argument	SP	204	(4)
GE Elective Upper Division			(8)
Social Sciences Category IV-C			(4)
Total General Education Courses			(73)

Professional Electives

Select 14 units from below:

Energy Conservation	ARC	333	(4)

Building Construction	ARC	341	(4)
Advanced Structures	ARC	425	(4)
Advanced Structures	ARC	426	(4)
Acoustics	ARC	434	(4)
Lighting	ARC	435	(4)
Conditioning Air	ARC	436	(4)
American Architecture	ARC	464	(4)
Contemporary Architecture	ARC	465	(4)
Contract Documents	ARC	472	(4)
The Architectect and The Development Process	ARC	473	(4)
The Architect and the Computer	ARC	474	(4)
Introduction to Acoustics	PHY	220	(4)
Engineering Electives			(8)
Cooperative Education	ENV	470	(4)
Total Professional Electives			14

Unrestricted Electives

Total Unrestricted Electives	8
TOTAL UNITS FOR 5-YEAR BACHELOR OF ARCHITECTURE DEGREE	250

Course Descriptions

(Courses open only to declared ARC Majors unless otherwise specified)

ARC 101 Introduction to Design (4)

The topic of design is discussed by lecturers in a range of professions from industrial design and film making to architecture, landscape architecture and urban planning. Exploration of the topics raised by lecturers will be conducted by teaching assistants coordinated by architecture faculty. This course is open only to students accepted into the Department of Architecture through the University admissions process. Lecture: 4 hours.

ARC 102 Introduction to Environmental Design (4)

The relationship between the design process and the man-made environment will be considered through lectures and projects. A series of exercises including graphics, photography and environmental study will be coordinated by in-class lectures and critiques. Prerequisite: ARC 101. Lecture: 4 hours.

ARC 103 Introduction to Architecture (4)

The process of design in architecture will be explored through a series of projects developed concurrently with a full quarter class project. Lectures will be given concerning the profession of architecture to develop an awareness for the role of design in architecture. Prerequisite: ARC 102. Lecture: 4 hours.

ARC 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or survey of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ARC 201 Architectural Design (8)

A review of basic visual design. Introduction to architectural drawing as a means of communication. Fundamentals of architectural design. Prerequisite: ARC 103. 5 lectures, 3 three-hour laboratories.

ARC 202 Architectural Design (8)

Explorations in architectural design focusing on the basic elements and patterns of buildings and of site context. Desgn of simple buildings. Prerequisite: ARC 201. 5 lectures, 3 three-hour laboratories.

ARC 203 Architectural Design (8)

Continuing explorations of architectural design concentrating on notions of dwelling environment. Fundamentals of design for solar and structural efficiency and expression. Prerequisite: ARC 202. 5 lectures, 3 three-hour laboratories.

ARC 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ARC 301 Architectural Design (8)

The design process as it relates to the single building. Study and application of the interaction of aesthetic, economic, technological and social determinants structuring the form of buildings. Design science lectures present methods of building, materials, environmental controls and building technology in conjunction with the design laboratory. Prerequisite: ARC 203, ARC 263, PHY 122, MAT 105. 5 lectures, 3 three-hour laboratories.

ARC 302 Architectural Design (8)

The design process as it relates to clusters of buildings and their contexts. Study of the aesthetic, economic, technical and social issues related to buildings. Emphasis is placed on construction technology, human behavior, and site development. Prerequisite: ARC 301. 5 lectures, 3 three-hour laboratories.

ARC 303 Architectural Design (8)

Emphasis on understanding the design process as it relates to multi-use buildings and their contexts including the interaction of aesthetic, economic, technological and social concerns. Prerequisite: ARC 302. 5 lectures, 3 three-hour laboratories.

ARC 321 Structures (4)

Theories of structural design and the relationship of structure to form, function, and economics. Analysis of structural systems, including the determination of forces, stresses, and deflections. The design of wood structures as a medium for introducing basic concepts of building and construction systems and materials. Prerequisite: MAT 105, PHY 122. 2 two-hour lectures.

ARC 322 Structures (4)

Theories of structural design and the relationship of structure to form, function, and economics. Analysis of structural systems, including the determination of forces, stresses, and deflections. The design of steel structures as a medium for introducing basic concepts of building and construction systems and materials. Prerequisite: ARC 321. 2 two-hour lectures.

ARC 323 Structures (4)

Theories of structural design and the relationship of structure to form, function, and economics. Analysis of structural systems, including the determination of forces, stresses, and deflections. The design of concrete structures as a medium for introducting basic concepts of building and construction systems and materials. Prerequisite: ARC 322. 2 two-hour lectures.

ARC 331 Environmental Controls (4)

Principles, evaluation and control of environmental systems. Prerequisite: PHY 122, PHY 142, MAT 106. 2 two-hour lectures.

ARC 332 Environmental Controls (4)

Integration, conservation and control of environmental systems. Prerequisite: ARC 331. 2 two-hour lectures.

ARC 333 Energy Conservation (4)

Integration and management of environmental systems in design to minimize energy and costs. Prerequisite: ARC 332. 2 two-hour lectures.

ARC 341 Building Construction (4)

Techniques of construction, building components and systems are investigated through case studies. Emphasis will be placed on the impact of technology on design criteria. Prerequisite: ARC 303. Two two-hour lectures.

ARC 361 Ancient and Medieval Architecture (4)

A survey of the architecture of ancient Greece and Rome, of the early Christian and Byzantine eras, and of the Romanesque and Gothic periods in Western Europe. Prerequisite: ENG 105. 2 two-hour lectures.

ARC 362 Renaissance and Baroque Architecture (4)

A survey of theory and design in Architecture and planning primarily concerning Italy, France, and England to 1750. Prerequisite: ARC 361. 2 two hour lectures.

ARC 363 Nineteenth and Twentieth-Century Architecture (4)

A survey of European and American architecture from the late eighteenth century to the mid-twentieth century including stylistic revivals, technological changes, and achievements of major architects. Prerequisite: ARC 362. 2 two-hour lectures.

ARC 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units with a maximum of 2 units per quarter. Prerequisite: ARC 303.

ARC 401 Architectural Design (8)

The application of fundamentals learned in preceding courses to architectural problems of increasing complexity. The development of concepts relating to theory and design sciences. The student will select a direction for study to be followed in architecture 402 and 403 focusing on problems relating to theory and urban design or the design sciences. Prerequisite: ARC 263, ARC 303, ARC 323, ARC 332, 5 lectures, 3 three-hour labs.

ARC 402 Architectural Design (8)

Concepts that relate to man-environment relations will be stressed, design research will be encouraged with the possibility of expanding such work into a project for the following quarter. Prerequisite: ARC 401. 5 lectures, 3 three-hour laboratories.

ARC 403 Architectural Design (8)

The intent of Architecture 403 is to allow the students to develop concepts in design theory or design development. Complex projects dealing with issues such as urban design or in-depth pursuit of research topics are used. Prerequisite: ARC 402. 5 lectures, 3 three-hour laboratories.

ARC 405 Architectural Design (8)

Series of sequential fifth year labs. Must be taken as a single block of instruction in one of the four directions: Architectural design and theory; architectural design and applied sciences; urban design studies in architecture; or interior architecture. Prerequisite: ARC 403. 5 lectures, 3 three-hour laboratories.

ARC 406 Architectural Design (8)

Series of sequential fifth year labs. Must be taken as a single block of instruction in one of the four directions: Architectural design and theory; architectural design and applied sciences; urban design studies in architecture; or interior architecture. Prerequisite: ARC 405. 5 lectures, 3 three-hour laboratories.

ARC 407 Architectural Design (8)

Series of sequential fifth year labs. Must be taken as a single block of instruction in one of the four directions: Architectural design and theory; architectural design and applied sciences; urban design studies in architecture; or interior architecture. Prerequisite: ARC 406. 5 lectures, 3 three-hour laboratories.

ARC 424 Seismic Design in Architecture (4)

A study of the fundamental characteristics of earthquake design in architecture. A survey of building codes, case studies of building performance in earthquakes and calculations relative to earthquake design. Prerequisite: ARC 323, MAT 105, PHY 122. 2 two-hour lectures.

ARC 425 Advanced Structures (4)

Topics of importance conducted in seminar addressing particular issues, such as seismic design, tensile structures and case studies in structural performance. Prerequisite: ARC 424. 2 two-hour lectures.

ARC 426 Advanced Structures (4)

The structural analysis of a building. The calculation of vertical and horizontal loads on a wood frame or steel structure, and the design and selection of the structural elements and connectors. Prerequisite: ARC 424. 2 two-hour lectures.

ARC 434 Acoustics (4)

Advanced study of the environmental distribution of sound and the related auditory responses as disciplines in design. Topics include auditoria and room acoustics, sound attenuation, open plan offices, speech intelligibility, background sound, noise criteria, timbre, echo, community noise. Prerequisite: ARC 332. 2 two-hour lectures.

ARC 435 Lighting (4)

Advanced study of the environmental distribution of light and the related visual responses as disciplines in design. Topics include study in daylight, sunlight, windows, electric lighting, task illumination, glare, flicker and color perception. Prerequisite: ARC 332. 2 two-hour lectures.

ARC 436 Conditioning Air (4)

Advanced study of the environmental distribution of air, conditioning air and the related human responses. Prerequisite: ARC 332. 2 two-hour lectures.

ARC 451 Theory of Architecture and Urbanism (4)

The theories which form the basis of architecture and urbanism including the art of giving visual coherence and organization to the built environment. 2 two-hour lectures. For non-majors only.

ARC 464 American Architecture (4)

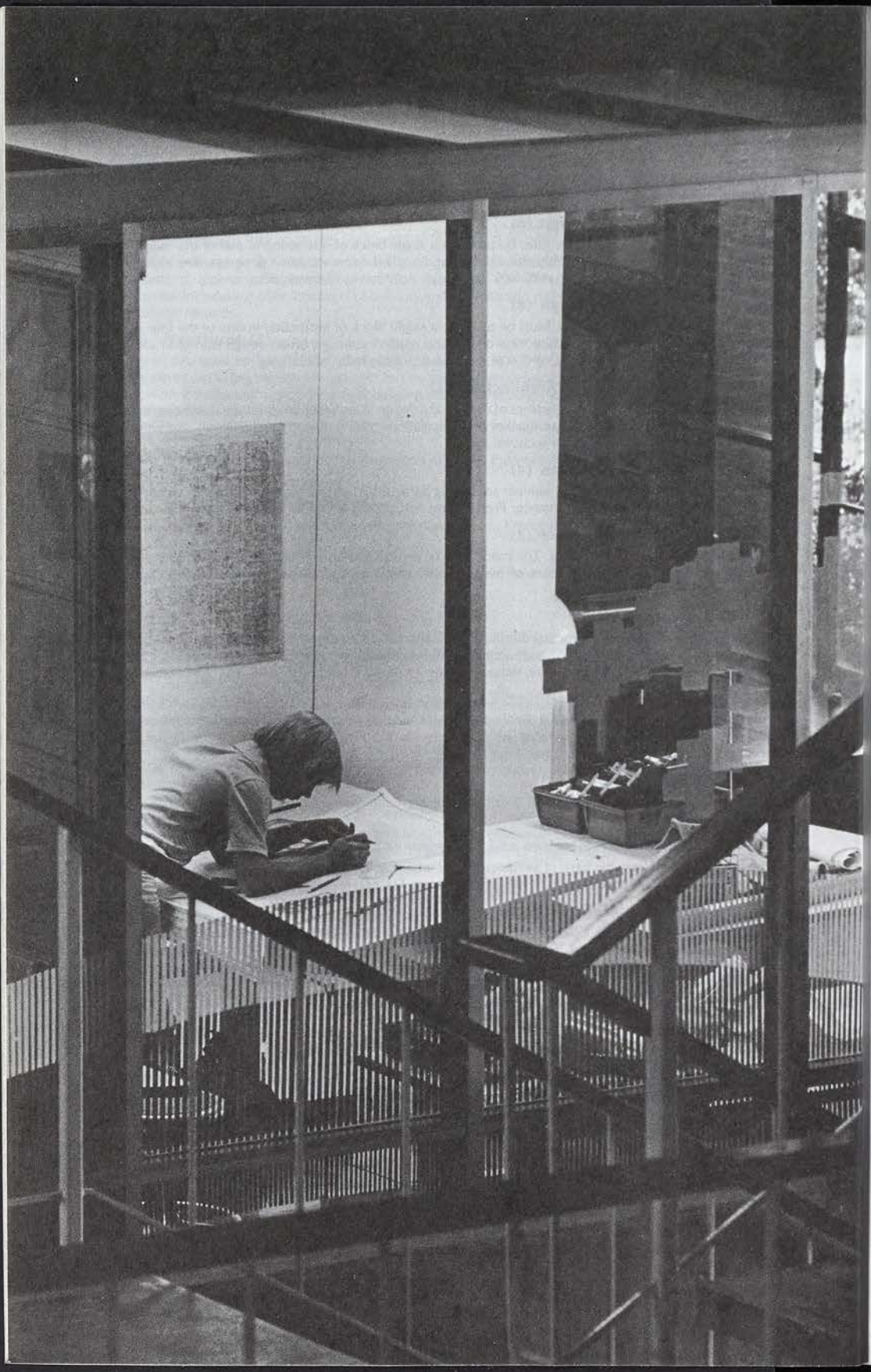
English, Spanish, and French Colonial American Architecture of the new republic. This will include nineteenth-century eclecticism and technical innovation with emphasis upon the architects H. H. Richardson and Louis Sullivan and their role in the formulation of a modern architectural theory. Prerequisites: ARC 263. 2 two-hour lectures.

ARC 465 Contemporary Architecture (4)

A study of the development of post-Bauhaus architecture in England, France, United States, Japan and South America. Prerequisite: ARC 363. 2 two-hour lectures.

ARC 471 Architectural Practice (4)

The administrative, legal, ethical aspects of the architectural profession and the relationship between the profession and the construction industry. Prequisite: ARC 203 or equivalent. 2 two-hour lectures.



ARC 472 Contract Documents (4)

Purpose and preparation of contract documents: working drawings, specifications, and contracts. Prerequisite: ARC 471. 2 two-hour lectures.

ARC 473 The Architect and the Development Process (4)

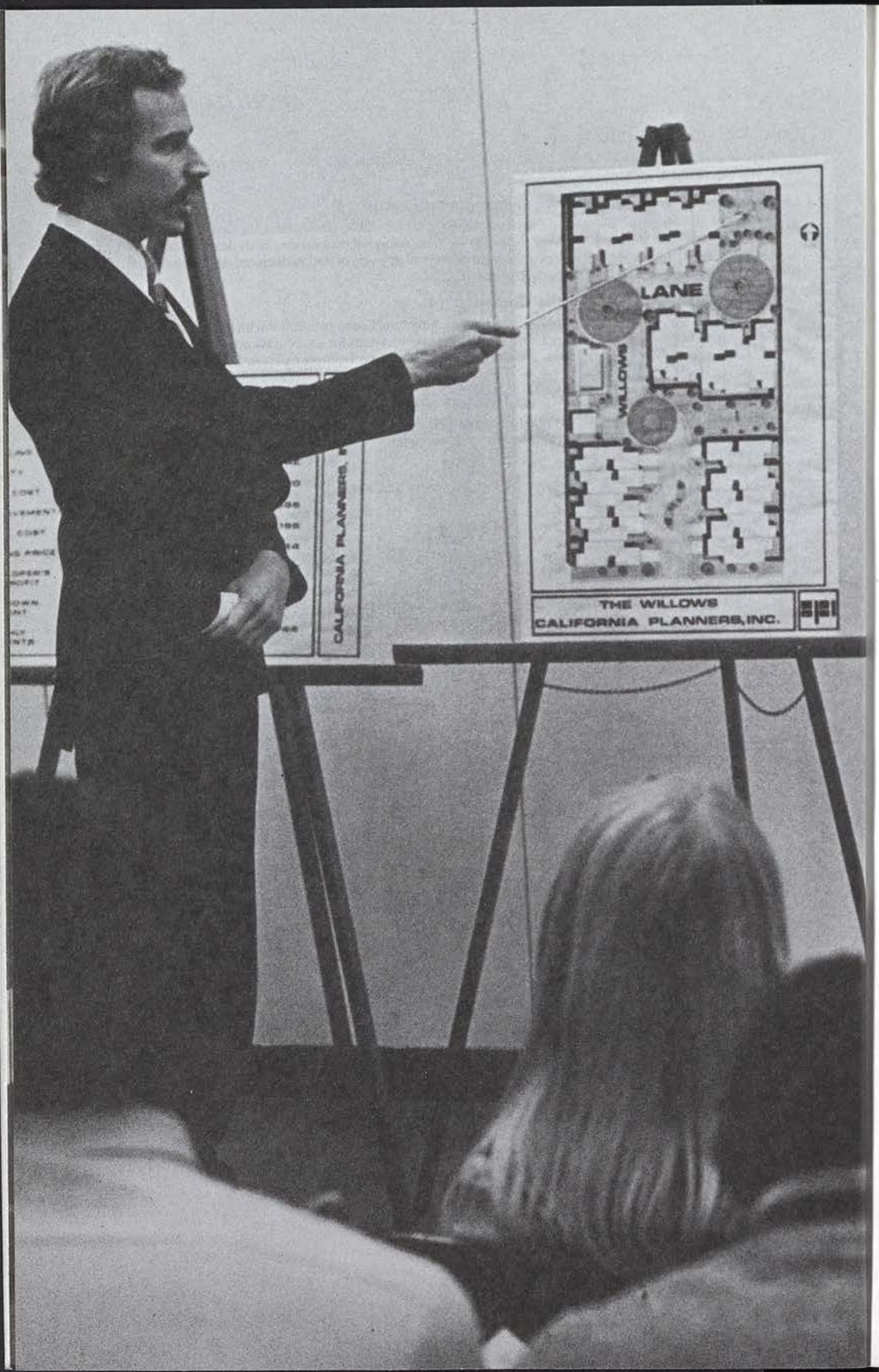
The potential roles of the architect in the development process will be discussed. Issues include goals, appraisal of needs, economics, and market analysis feasibility studies, appraisal procedures, cash flow methods, financing options, decisions, design and delivery processes, involvement at levels of design decisions and project administration. Prerequisite: ARC 471. 2 two-hour lectures.

ARC 474 The Architect and the Computer (4)

Potential and role of the computer in the practice of architecture. Issues included will be the role of the computer in the design process, as a business tool and as a management system for future environmental control systems. This course is jointly conducted with a private firm and will not be held on campus. Prerequisite: ARC 472. 2 two-hour lectures.

ARC 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Prerequisite: Permission of instructor with advance approval of topic selected. Lecture, lab or combination.


LANE
WILLOWS
THE WILLOWS
CALIFORNIA PLANNERS, INC.

LANDSCAPE ARCHITECTURE

John T. Lyle, *Chair*

Stephen F. Bochkor
Francis H. Dean
Jere Stuart French
Kenneth S. Nakaba
Jeffrey K. Olson
Robert C. Perry, Jr.
D. Rodney Tapp
Takeo Uesugi
Chester A. Volski
Mark J. von Wodtke

The Bachelor of Science in Landscape Architecture is accredited by the American Society of Landscape Architects and approved by the California Board of Landscape Architects.

The program emphasizes two areas—regional landscape design and urban landscape design. The regional emphasis includes conservation measures and proper use of land for recreational and resource development purposes based on an understanding of natural processes. Employment opportunities for graduates are found with the U.S. Forest Service, National Park Service, state departments of parks and recreation, county agencies, civil systems divisions of aerospace companies, and with consultants doing large scale work.

The urban emphasis is concerned with humanizing man's urban environment and includes exposure to psychological, social, economic, and political forces. The student is involved with complex problems concerning residential, commercial, and industrial developments, recreational and educational facilities planning, and new towns. Employment opportunities are found in private practice, with municipal and county parks departments and planning departments, with industrial and commercial firms, and with residential construction companies.

Undergraduate and graduate students with at least a 3.0 GPA have the opportunity to join Sigma Lambda Alpha, Mu Chapter, an honorary society for landscape architecture majors.

Laboratory for Experimental Design

The laboratory has been established to carry on research and pilot projects in the application of experimental methods in landscape architecture. Generally, the work is done by faculty members and graduate students working in teams which often include members from other departments. Some assistantships are available to students who have attained a high level of professional skill.

CORE COURSES FOR MAJOR

(Required of all students)

Intro to Env Design	LA	101	(4)
Intro to Landscape Design	LA	102	(4)
Landscape Design Methods	LA	103	(4)
Intro to History of Landscape Arch	LA	121	(3)
Basic Landscape Design	LA	201	(4)
Basic Landscape Design	LA	202	(4)
Basic Landscape Design	LA	203	(4)
Graphic Communication	LA	231	(3)
Landscape Graphics	LA	232	(3)
Plant Materials and Design	LA	241	(4)
Plant Materials and Design	LA	242	(4)
Plant Materials and Design	LA	243	(4)
Inter Landscape Des	LA	301	(4)
Inter Landscape Des	LA	302	(4)
Inter Landscape Des	LA	303	(4)
Landscape Constr	LA	331	(4)
Landscape Constr	LA	332	(4)
Landscape Constr	LA	333	(6)
Plant Design	LA	343	(4)
Plant Design	LA	344	(4)
Adv Landscape Des	LA	401	(6)
Adv Landscape Des	LA	402	(6)
Adv Landscape Des	LA	403	(6)
The Regional Landscape	LA	422	(3)
The Urban Landscape	LA	423	(3)
World Gardens	LA	424	(3)*
Senior Seminar	LA	463	(2)
Landscape Arch Practice	LA	464	(2)
Landscape Arch Proj	LA	465	(2)

SUPPORT & ELECTIVE COURSES

(Required of all students)

Landscape Constr	AE	124	(3)
Landscape Surveying	AE	232	(3)
Amer Civiliz	AMC	201	(4)
or Intro to American Government	PLS	201	
Amer Civiliz	AMC	202	(4)
or U.S. History	HST	202	
Intro to Drwg	ART	140	(3)
Basic Biology	BIO	115	(5)
Fundls of Chem	CHM	103	(4)
Freshman Comp	ENG	104	(4)
Freshman Comp	ENG	105	(4)
Physical Geology	ESC	111	(3)
Trigonometry	MAT	106	(4)
College Algebra	MAT	105	(4)
General Psychology	PSY	201	(4)
Basic Soil Sci	SS	231	(4)
Advocacy and Argument	SP	204	(4)

Courses needed to complete General Education Requirements (one course from area A, B and C of G.E. Category III; one 4 unit course must be upper division. One course from area A, B, and C in Category IV.2 approved courses Cat. VII) ..... (32)

* May be substituted for LA 422 or LA 423.

Course Descriptions

(open to LA majors only unless otherwise specified)

LA 101 Introduction to Environmental Design (4)

Introduction to environmental design stressing encounters with distinguished people in this field. Concepts of discipline, order and passion, and the commonality found in architecture, landscape architecture, urban planning, physical sciences and the humanities. Presentations by faculty will be augmented by members of other departments and by noted speakers from off campus. An introductory course for those interested in environmental design as a profession as well as from other schools and departments. 2 two-hour lectures. May be taken by non-LA majors with permission of instructor only.

LA 102 Introduction to Landscape Design (4)

Principles of basic design and their application in the development of design concepts; use of creative problem-solving techniques in landscape design; sensory exploration and interpretation of factors that shape natural and man-made landscapes. 2 one-hour lectures, 2 three-hour laboratories. Prerequisite: LA 101 and admission into the LA major.

LA 103 Landscape Design Methods (4)

Techniques for organizing and synthesizing varied elements in the shaping of landscape form; recognition of major design determinants and the role of landscape architects and other professionals in dealing with diverse aspects of design, stressing application of ideas through construction of full-scale experimental projects. 2 one-hour lectures, 2 three-hour laboratories. Prerequisite: LA 102.

LA 121 Introduction to History of Landscape Architecture (3)

Study of man's efforts to create and control his physical environment, emphasizing major historical landscapes in their relationships with cities and buildings, and in terms of their cultural, social, political and economic contexts. 3 lectures. May be taken by non-LA majors.

LA 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

LA 201, 202, 203 Basic Landscape Design (4) (4) (4)

Fundamental concepts of site planning and design and their application to basic landscape problems, with particular emphasis on varying conditions of climate, plant communities, land forms and orientation. 2 lectures, 2 three-hour laboratories. Prerequisite: LA 103.

LA 231 Graphic Communication (3)

Use of graphic media for communication and interpretation of form; freehand, sketching, mechanical drawing, composition, lettering and still photography. 1 lecture, 2 three-hour laboratories. To be taken concurrently with LA 201. Prerequisite: LA 103.

LA 232 Landscape Graphics (3)

Development of communication skills emphasizing perspective and delineation techniques as they relate to landscape architecture. Laboratory course; 2 three-hour laboratories, 1 lecture. To be taken concurrently with LA 202. Prerequisite: LA 231.

LA 241, 242, 243 Plant Materials and Design (4) (4) (4)

An introduction to planting design issues based upon ecological, functional and aesthetic design principles. Instruction includes the identification of plant materials appropriate for use in California including: trees, shrubs, vines and herbaceous plants. 2 lectures, 2 three-hour laboratories.

LA 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

LA 301, 302, 303 Intermediate Landscape Design (4) (4) (4)

Application of design concepts and principles to more difficult problems involving a wide range of conditions in the physical environment. 1 lecture, 3 three-hour laboratories. Prerequisite: LA 203; ENG 104, 105. Limited to 4 units per quarter.

LA 331, 332, 333 Landscape Construction (4) (4) (6)

Landscape construction problems involving the formulation and preparation of plans for grading, drainage, staking, reference and lighting, planting, irrigation, construction details, structures, and other working drawings; relationship to specifications and contract docements. For LA 331, 332: 2 lectures, 2 three-hour laboratories. For LA 333: 4 lectures, 2 three-hour laboratories. Prerequisites: MAT 105, 106; LA 203, AE 124, 232.

LA 343, 344 Planting Design (4) (4) F,W.

A continuation of LA 241, 242, 243 with greater emphasis given to the organization and composition of plant materials towards solving design problems. Instruction includes development of planting plans, details, cost estimates, and specifications. 2 lectures, 2 three-hour laboratories. Prerequisite: LA 241, 242, 243.

LA 400 Special Problems for Upper Division Students (1-2)

Individual group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

LA 401, 402, 403 Advanced Landscape Design (6) (6) (6)

The analysis, programming, and solution to advanced projects in landscape design. Students must select one of these areas of specialization: urban, rural regional projects, or special landscape problems. 3 lectures, 3 three-hour laboratories. Prerequisite: LA 303.

LA 422 The Regional Landscape (3)

How the landscape has guided human activity and habitat patterns on the regional and global scales, and how these patterns have in turn changed the natural landscape. Emphasis on major periods of urbanization, agricultural expansion, and development of recreation, conservation and open space systems, along with projections for the future. 2 lectures, 1 laboratory. Prerequisite: LA 121.

LA 423 The Urban Landscape (3)

Urban space as traced through history, concentrating primarily on the development of the square and the park from the classic agora to the complexities of public space in modern western cities. The design of the city park is traced from the industrial era to present. Innovations and changing concepts in leisure and recreation are noted. 2 lectures, 1 laboratory. Prerequisite: LA 121.

LA 424 World Gardens (3)

History of garden design emphasizing Italian Renaissance, 17th century France and the English Natural period. Primary development of American gardens from colonial times to present. Oriental, Moorish, Hindu and Mogul gardens. 2 lectures, 1 laboratory. Prerequisite: LA 121.

LA 441 Internship (1-2)

On-the-job training in the profession dealing with some aspect of landscape architecture. The experience must involve learning as well as production. Internships must be approved in advance by the departmental internship coordinator. One unit of credit is granted for each 50 hours of training under a licensed professional. May be repeated for a maximum of 6 units. Prerequisite: Approval of instructor.

LA 463 Senior Seminar (2)

Discussions of environmental design problems. The role of the landscape architect in society. Two meetings.

LA 464 Landscape Architectural Practice (2)

The practice of landscape architecture, covering professional responsibilities and ethics, client and contractor relationships. Lecture, 2 hours.

LA 465 Landscape Architectural Project (2)

Selection and completion of a project with formal report done under faculty supervision. Projects typical of problems which graduates must solve in their field of employment. Minimum of 120 hours.

LA 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

Graduate courses are listed in the graduate section of this catalog.

URBAN AND REGIONAL PLANNING

_____, *Chair*

Harry A. Anthony
David E. Bess
William R. Dale
Sherman W. Griselle
Charles E. Loggins
Margarita P. McCoy
Charles R. Stapleton
Sylvia White

The unique undergraduate program in urban and regional planning develops problem solvers with imagination and a desire to work with people. Planners understand the balance among physical, economic, social, political and ecological forces in the environment. Most of their efforts aim at providing a context for development decisions and finding ways to carry them out. Emphasis is upon learning the skills used to shape future urban areas, and class work is often based on real life situations in local communities.

The Bachelor of Science in Urban Planning has received recognition by the American Planning Association. For information about the graduate program in Urban Planning, see the Graduate Program announcement.

CORE COURSES FOR MAJOR

(Required of all students)

Introduction to the Planning Profession	UP	101	(4)
Urban Planning Graphics	UP	201	(6)
Urban Design Awareness	UP	202	(6)
Urban Design	UP	203	(6)
Prin of Urban Planning	UP	301	(4)
Community Facilities	UP	302	(4)
Land Planning	UP	303	(6)
Planning Research Methods	UP	331	(6)
Planning Studies	UP	332	(6)
Intro to Urban Trans	UP	336	(4)
Evolution of Cities	UP	410	(4)
Evolution of Cities	UP	411	(4)
Plan & Urban Des Thr World	UP	412	(3)
General Plan Survey	UP	431	(5)
General Plan Devel	UP	432	(5)
Regional Planning	UP	433	(4)
Community Devel & Renewal	UP	434	(5)
Senior Project	UP	461	(2)
Senior Project	UP	462	(2)
Undergraduate Seminar	UP	463	(2)
Urban Planning Implementation	UP	465	(4)
Select 11 units, with approval of advisor, from courses listed below:			
World Planning and Urban Design	UP	413	(3)
Planning Policy Analysis	UP	421	(4)
Urban Planning Management	UP	470	(4)
Planning in Developing Nations	UP	475	(4)

SUPPORT & ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or US History	HST	202	
Report Writing	COM	216	(4)
Prin of Economics	EC	201	(4)
Freshman Composition	ENG -	104	(4)
Environmental Geology	ESC	250	(3)
Prin of Real Estate and L and Ec	FRL	106	(4)
Intro to Computing	CIS	110	(4)
Trigonometry	MAT	106	(4)
College Algebra	MAT	105	(4)
General Psychology	PSY	201	(4)
Advocacy and Argument	SP	204	(4)
Other Support			(18)
Courses to complete General Education Requirements (One course each from Category II (Pattern 2) area B and C with one of these including a lab; one course from each area of Category III; one course each from Category IV-B and C one must be upper division, Category VII two courses)			(36)
Directed Electives			(10)
Electives			(5)

Course Descriptions

UP 101 Introduction to the Planning Profession (4)

Introduction to the urban planning profession and the issues studied in the undergraduate urban planning curriculum. Emphasis on planning for Southern California. Includes guest lectures and field trips. Required for all incoming undergraduate planning majors. Three lectures, one two-hour activity.

UP 201 Urban Planning Graphics (6)

Development of graphic skills; drawing for reproduction; presentation of equipment and materials. Understanding of form, function, and principles of visual communication. 3 lectures, 3 three-hour laboratories.

UP 202 Urban Design Awareness (6)

Theory of environmental design and relationships between natural and man-made environments. Studio problems emphasizing design responses to natural systems. 3 lectures, 3 three-hour laboratories. Prerequisite: UP 201.

UP 203 Urban Design (6)

Urban design practice. Design, research, analysis and programming. Preparation of solutions for a variety of urban design problems. 3 lectures, 3 three-hour laboratories. Prerequisite: UP 202.

UP 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination of both.

UP 301 Principles of Urban Planning (4)

The planning function in government. The planning process. Principles for projecting land requirements and locations for various urban land uses. Ways of implementing the plans. 4 lectures.

UP 302 Community Facilities (4)

The importance of community facilities and services to urban development. Discussion of the planning, construction and operation of a variety of urban facilities. Review of technological advances. 3 lectures. 3 hours of laboratory.

UP 303 Land Planning (6)

Design of various types of subdivisions, planned unit development and the redesign of urban land. Review of recent trends and events affecting land planning. Necessary to permit increased instruction in sophisticated techniques of hillside development, urban infill and environmental review processes. Two lectures, 12 hours of laboratory.

UP 331 Planning Research Methods (6)

Problems and methods of urban planning research and analysis. Types of basic planning data required, information sources, collection and analysis. Emphasis is on individual research, report writing, and graphic presentation. 4 lectures. 6 hours of laboratory. Prerequisite: UP 301. MAT 105.

UP 332 Planning Studies (6)

Review of typical planning studies from California and elsewhere. Advanced methods of planning research and analysis. Study and formulation of proposals for typical planning problems and planning projects. 4 lecture. 6 hours of laboratory. Prerequisite: UP 331.

UP 336 Introduction to Urban Transportation (4)

Transportation history and modes. Population, land use, and transportation relationships. Planning, programming, and financing transportation systems. 3 lecture-discussions, 3 hours of laboratory. Prerequisite: UP 301, MAT 105.

UP 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

UP 410 Evolution of Cities (4)

Historical review of cities from antiquity to modern times. Ecological, social, economic, technological, political and cultural determinants of city location, form, growth or decline. Role of the city as a force of culture and civilization. The origins and development of cities in Europe, Asia, Africa and pre-Columbian America. 4 lectures.

UP 411 Evolution of Cities and of Planning in America (4)

Origins and evolution of the city in America during the past four centuries. Historical review of the development of American city planning from 1600 to the present. Urban development of California and of the Los Angeles region. 4 lectures.

UP 412 Planning and Urban Design in Europe (3)

Illustrated lectures on contemporary planning and urban design theory and practice currently in evidence in Western Europe. Contemporary theories and concepts as related to present social concerns. Relevance of the European experience to the solution of America's urban problems. 3 lecture-seminars. Prerequisite: upper division standing.

UP 413 World Planning and Urban Design (3)

Contemporary planning and urban design concepts and practices in Eastern and Northern Europe, Canada, Latin America, Asia and Africa. Urban planning in the Soviet Union. The problem of urban squatters in developing and underdeveloped countries. 3 lecture-seminars. Prerequisite: UP 412.

UP 421 Planning Policy Analysis (4)

Theories and methods for evaluating planning proposals and projects. Use of analysis techniques drawn from the social sciences dealing with urban planning policies and programs. 4 lecture-discussions. Prerequisite: UP 331, EC 201.

UP 431 General Plan Survey (5)

General plan research and survey procedures. Programming for a general plan. 3 lectures, 6 hours of laboratory. Prerequisite: UP 332.

UP 432 General Plan Development (5)

Emphasis on policy planning, synthesis, and formulation of a general plan through individual creative effort. 3 lectures, 6 hours of laboratory. Must be taken immediately following UP 431.

UP 433 Regional Planning (4)

Review of county, regional, state, and national planning. Emphasis on regional planning. 3 lectures. 3 hours of laboratory. Prerequisite: UP 432 or permission of the instructor.

UP 434 Community Development and Renewal (5)

The history, legal background and process of community development and urban renewal. Study of conservation, rehabilitation and redevelopment practices. Problems involved in federal, state, and local, public and private communtiy development programs. 3 lectures, 2 seminar. Prerequisite: UP 332.

UP 441 Field Work (2-3)

Practical application of urban planning techniques through supervised field work. Written report and evaluation of experience required. (One unit of credit will be allowed for each 60 hours of field work.) May be repeated for a maximum of 6 units for undergraduates, maximum of 3 units for graduate credit. 1 lecture and 6 to 12 hours of field work. Prerequisite: permission of instructor.

UP 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in urban planning field. Project results presented in a formal report. Minimum 60 hours total time per two-unit course. Prerequisite: senior standing.

UP 463 Undergraduate Seminar (2)

Intensive study of the legal, ethical, and professional aspects of urban planning in public and private practice. Review of urban planning problems. 2 seminars. Prerequisite: Senior standing.

UP 465 Urban Planning Implementation (4)

Review of zoning ordinances, subdivision regulations, capital improvement programs, and other devices and techniques used to implement a general plan. 4 lectures. Prerequisite: UP 332.

UP 470 Urban Growth Management (4)

The impact of urban growth on the environment. Preparation of Environmental Impact Reports. Current methods, procedures and trends for managing urban growth. 4 lecture/discussions. Prerequisite: UP 332.

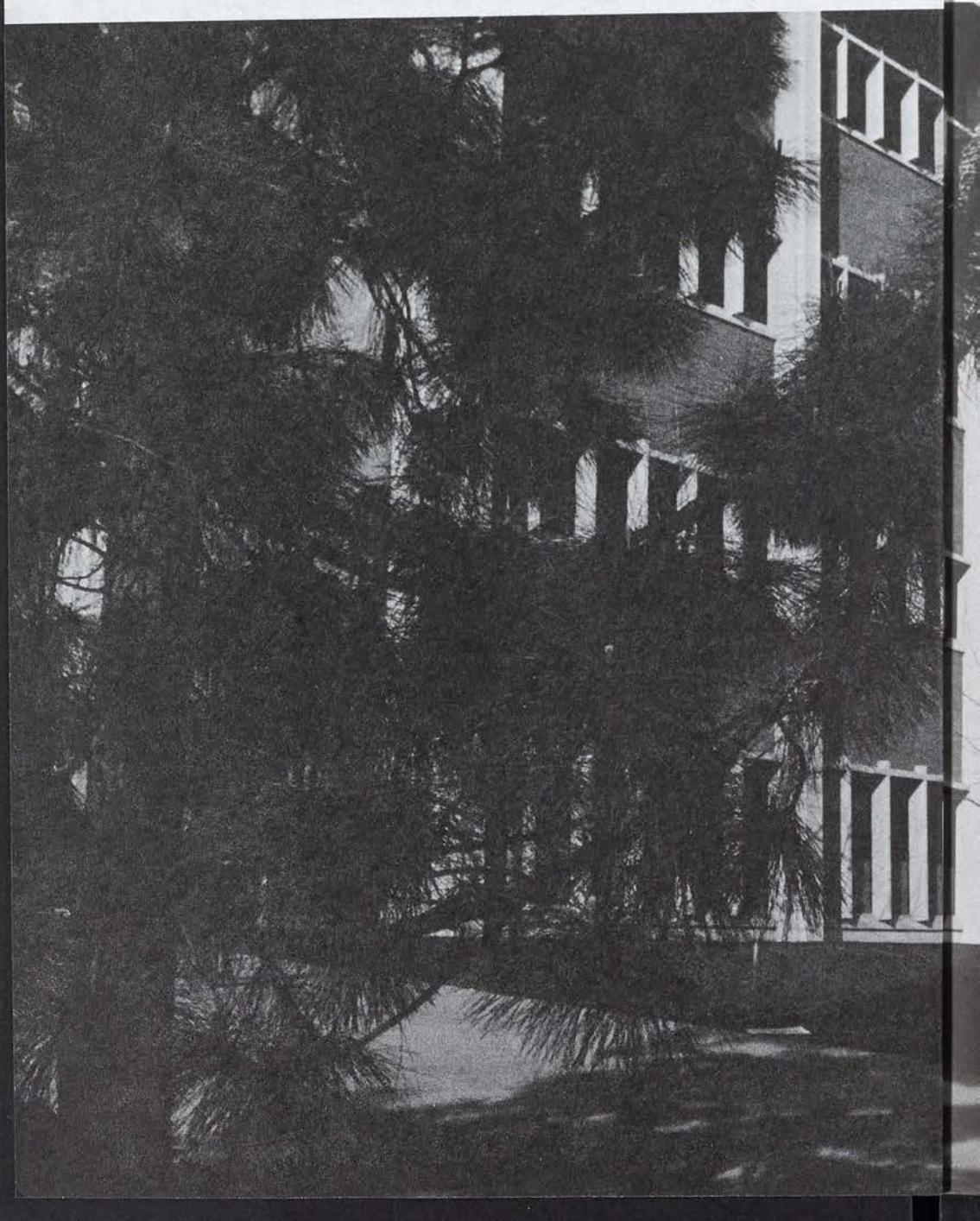
UP 475 Planning in Developing Nations (4)

Major issues confronting planners working in developing nations. Introduces theory and practice of development planning. Explores spatial, cultural and economic factors associated with major problems and examines development of appropriate policies and programs. Study of alternative approaches for achieving developmental aims. Four lecture/discussions. Prerequisite: area studies course in History, Political Science or Anthropology, or permission of instructor.

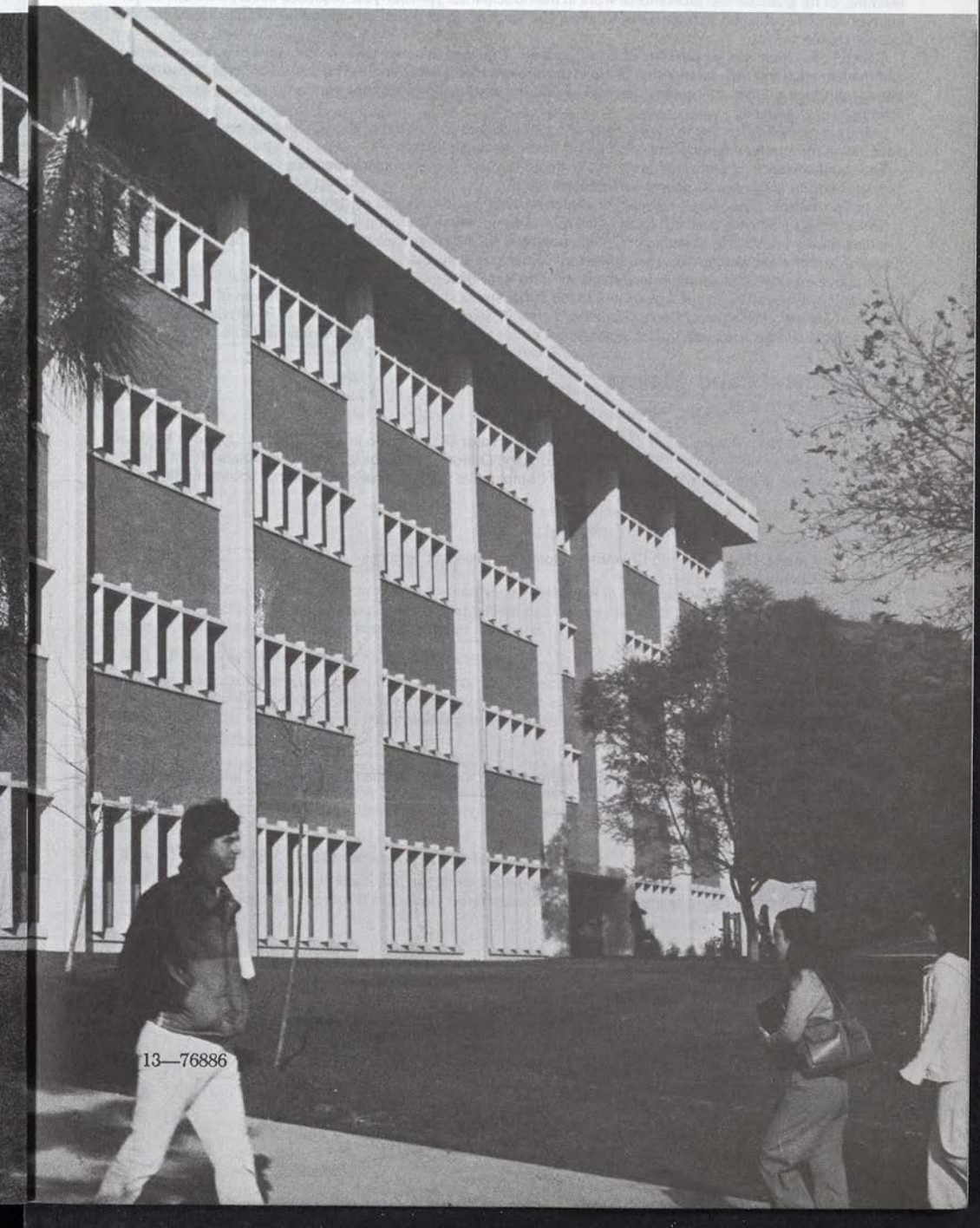
UP 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Instruction is by lecture, laboratory, or a combination of both.

Graduate courses listed in the graduate section of this catalog.



SCHOOL OF SCIENCE



SCHOOL OF SCIENCE

Ralph W. Ames, Dean

Esther B. Leffler, Associate Dean

The curricula offered in the School of Science combine fundamental education in science or mathematics with a broad human outlook which develops the student's mental horizon beyond the limits of his/her immediate vocational objective.

Each curriculum is designed to prepare graduates for specific professional positions in industry, government and teaching, or for graduate and professional work in their disciplines. The four-year sequence covers the basic major courses and has sufficient free electives to allow the students to develop specializations within the major and closely related fields.

General education courses are offered for all students. The need to understand the concepts of modern science and mathematics and their relationship to life in our present world is important. The School of Science also offers basic supporting courses for students enrolled in the professional and technological degree programs in other schools of the university.

Majors in nine fields leading to the bachelor of science degree are offered by the School of Science. Information concerning the master's curricula may be found in the graduate listings.

The standard teaching credential program is offered for both the elementary specialization and the secondary specialization in a number of majors and minors.

A pre-professional program is offered for students preparing for medical or dental school.

The School of Science actively fosters dialog and joint research among campus scientists through special institutes and symposia. The Institute for Cellular and Molecular Biology (see catalog section on Special University Centers) and the Institute for Advanced Systems Studies are particularly active in these areas.

An active co-curricular program includes Beta Beta Beta Biological honor society; Biological Sciences Club; Microbiology Club; a chapter of Kappa Mu Epsilon (mathematics); a chapter of student affiliates of the American Chemical Society; Society of Physics Students; Sigma Pi Sigma, national honor society in physics; Upsilon Pi Epsilon, national honor society in Computer Science; the Geology Club and other organizations.

Departments and Majors

BIOLOGICAL SCIENCES

Don C. Force, *Chair*

Biology major (BS); Botany major (BS); Microbiology major (BS): Option in Microbiology, Option in Medical Technology; Zoology major (BS): Option in Zoology, Option in Entomology. Minors in Botany, Plant Pathology, Microbiology, Zoology, Entomology, and Comparative Systems Analysis. Master of Science in Biological Sciences.

CHEMISTRY

Victor P. Abegg, *Chair*

Chemistry major (BS) Option in Chemistry; Option in Chemical Sciences

Minor in Chemistry

Master of Science in Chemistry

COMPUTER SCIENCE

Bruce Hillam, *Chair*

Computer Science major (BS)

EARTH SCIENCES

Donald W. Tarman, *Chair*

Earth Sciences Major (BS) (BA)

MATHEMATICS

V. Merriline Smith, *Chair*

Mathematics Major (BS); Option in Pure Mathematics; Option in Applied Mathematics; Option in Statistics; Option in Secondary Teaching

Minor in Statistics

Master of Science in Mathematics

PHYSICS

Harvey S. Leff, *Chair*

Physics Major (BS)

Physics Minor

Cooperative Education

This program combines classroom study with closely related work experience. Its basic purpose is to provide a means whereby a student can combine study at Cal Poly with work experience.

Science Advisory Office

This office has been established and is open eight hours each day to assist students in preparing their schedules as well as handle all petitions (withdrawal, reinstatement, dual enrollment, etc.) All articulation agreements and forms pertaining thereto are also in this office.

Pre-Professional Preparation

(Center for Health Science Advising)

Pre-Dental, Pre-Medical, Pre-Veterinary, Others

A science major is often very suitable for undergraduate preparation for medical, dental, veterinary and other professional schools. The list below summarizes the basic requirements for most professional schools. Requirements for a particular school may vary. Students who are interested in professional preparation should consult with the professional advisor listed below.

RECOMMENDED COURSES

Freshman Composition	ENG	104	(4)
Freshman Composition	ENG	105	(4)
Basic Biology	BIO	115	(5)
Invertebrate Zoology	ZOO	137	(5)
Vertebrate Zoology	ZOO	138	(5)
College Chemistry	CHM	104	(3)
College Chemistry	CHM	105	(3)
College Chemistry	CHM	106	(3)
and			
College Chemistry Lab	CHM	141	(1)
College Chemistry Lab	CHM	142	(1)
College Chemistry Lab	CHM	143	(1)
and			
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry	CHM	113	(3)
and			
General Chemistry Lab	CHM	151	(1)
General Chemistry Lab	CHM	152	(1)
General Chemistry Lab	CHM	153	(1)
Organic Chemistry	CHM	314	(3)
Organic Chemistry	CHM	315	(3)
Organic Chemistry	CHM	316	(3)
Organic Chemistry Lab	CHM	317	(1)
Organic Chemistry Lab	CHM	318	(1)
Organic Chemistry Lab	CHM	319	(1)
College Physics	PHY	121	(4)
College Physics	PHY	122	(4)
College Physics	PHY	123	(4)

For additional recommended and support courses, see Preprofessional Advisor:

Dr. David Steele—Medicine, Dentistry, etc.
Dr. Ruth J. Bowen—Medicine, Dentistry, etc. with Chemistry major
Dr. J. E. Dimitman—Veterinary Medicine
Dr. L. M. Knill—Veterinary Medicine

SCI 210, 211, 212 Physical Science (4) (4) (4)

The basic elements of physics, chemistry, and the earth sciences taught in an interdisciplinary manner. Laboratory sessions emphasize fundamental experiments that will be particularly useful for elementary school teachers. 3 lectures, 1 three-hour lab. Courses must be taken in sequence.

SCI 450 Philosophic Implications of Science (4) Sp

Reading and discussion of works of eminent scientists and philosophers concerning those results of science that have a bearing on philosophic problems. Readings may be from authors such as Schrodinger, Russell, Huxley, Chardin, Kuhn. 3 lectures. Prerequisite: senior standing in one of the natural or physical sciences, mathematics or consent of the instructor.

SCI/EGR 460 Problems in Oceanographic Studies (3-5)

Course offered in conjunction with the Southern California Ocean Studies Consortium (SCOSC). Topics vary each term. See chair of Biology Department for further information. Upper division standing and permission of instructor required.

SCI 470, 471, 472, 473 Cooperative Education (2-4)

Part-time or full-time work experience that applies scientific principles to practice. To be taken in sequence. Prerequisite: Junior standing or approval of co-op coordinator. The work assignment must have prior approval. Maximum 16 units.

BIOLOGY

One of the four majors offered in the biological sciences department is biology. For other programs in this department see botany, microbiology, and zoology.

Don C. Force, *Chair*

Pamela J. Sperry, *Coordinator*

Jill P. Adler	J. Curtis Clark	David J. Moriarty
Vivienne N. Armentrout	Ronald S. Daniel	Ronald D. Quinn
Keith E. Arnold	Jack L. Erspamer	Edward T. Roche
Jonathan N. Baskin	Bruce L. Firstman	David F. Steele
Howard S. Brown	Lamar M. Knill	Glenn R. Stewart
Gilbert D. Brum	George W. Martinek	Laszlo J. Szijj
David P. Campbell	Larry K. McKane	Lenard R. Troncale
Peter Castro	Edward K. Mercer	Jia-Hsi Wu

The biology section stresses a balance between the theoretical aspects of biology and actual experience in field and laboratory. The variety of courses offered in a flexible curriculum provides an opportunity for a wide range of experience in both animal and plant sciences.

The offerings of this curriculum provide the student with a preparation for graduate and professional schools in fields ranging from molecular to field biology. Departmental facilities include a molecular biology laboratory, greenhouses, controlled environmental units, a radiation biology laboratory, plant and animal collections, and an electron microscope facility. Ecological studies are facilitated by accessibility to natural habitats on campus and by the university's proximity to desert, mountain, and seashore areas. Courses in marine and fresh water biology provide preparation for teaching, conservation, wildlife management, or graduate research in aquatic biology. Courses in marine biology interact with the Ocean Studies Consortium of the CSU.

The curriculum prepares prospective teachers for the secondary education credential. Graduate courses enable students to complete requirements for the junior college credential.

Students majoring in biological sciences and who have at least a 3.0 GPA have the opportunity to join Beta Beta Beta, an honorary society in the biological sciences department. For additional information contact the department office.

The biology section also offers a curriculum leading to the Master of Science in Biology with emphasis in biology.

CORE COURSES FOR MAJOR

(Required of all students)

Env. Conservation	BIO	201	(3)
Principles of Evolution	BIO	213	(4)
Genetics	BIO	303	(4)
Biological Systematics	BIO	306	(3)
Principles of Ecology	BIO	325	(4)
Biometrics	BIO	411	(3)
Cellular Physiology	BIO	435	(4)
or Plant Physiology	BOT	422	(5)
or Comparative Animal Physiology	ZOO	424	(5)
Senior Seminar	BIO	490	(1,1)
Plant Structures and Functions	BOT	124	(5)
Plant Morphology	BOT	125	(5)
Basic Microbiology	MIC	201	(5)
Invertebrate Zoology	ZOO	137	(5)
Vertebrate Zoology	ZOO	138	(5)
Intro to Entomology	ZOO	226	(4)
Upper Division courses in Biological Sciences			(8)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

College Chemistry	CHM	106	(3)
College Chemistry Lab	CHM	142	(1)
College Chemistry Lab	CHM	143	(1)
Organic Chemistry	CHM	201	(3)
Organic Chemistry Lab	CHM	250	(1)
Elements of Biochemistry	CHM	321	(4)
Technical Calculus	MAT	130	(4)
College Physics	PHY	121	(3)
College Physics	PHY	122	(3)
College Physics	PHY	123	(3)
College Physics Lab	PHY	141	(1)
College Physics Lab	PHY	142	(1)
College Physics Lab	PHY	143	(1)
Approved electives			**(15)
Free Electives			(18)

Students considering graduate work or professional schools, see recommended courses for pre-professional preparation.

** Approved electives include all 300 and 400-level courses in the biological sciences not specifically designed for nonmajors. See advisor for approval of courses offered by other departments.

GENERAL EDUCATION REQUIREMENTS

Category I: (Pattern 2)			
A. Freshman Composition	ENG	104	(4)
B. Advocacy and Argument	SP	204	(4)
C. Freshman Composition	ENG	105	(4)
Category II: (Pattern 1)			
A. College Algebra	MAT	105	(4)
B. College Chemistry	CHM	104	(3)
College Chemistry Laboratory	CHM	141	(1)
C. Basic Biology	BIO	115	(5)
D. College Chemistry	CHM	105	(3)
Category III:			
Select one course from each area. Minimum total			(12)

Category IV:
Select one course from each area. Minimum total ..... (12)
Category V:
Select one of following:
CPU 201, CPU 202 *or* PSY 201 ..... (4)
Category VI:
Select one course from each area. Minimum total ..... (8)
Category VII:
Upper Division—minimum ..... (8)
(An additional 4 unit upper division course must be taken to replace a CAT. III or IV lower division course SEE ADVISOR)

Course Descriptions

F, W, Sp and Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified, the course is offered each year during the indicated quarter(s). Parentheses signify that the course *may* be offered during the quarter(s) they enclose. When appropriate, the names of faculty associated with each course are specified; otherwise, "Staff" is noted.

BIO 100 Fundamentals of Biology (4) FSp

A lecture-laboratory demonstration and discussion course dealing with various aspects of scientific investigation, environmental problems, population, genetics, evolution, physiology and other student selected topics. 3 lectures, 1 three-hour laboratory. Prerequisite: Consent of instructor. *Staff.*

BIO 110 Life Science (3) FWSpSu

Basic concepts in the study of living systems, including human beings. The study of biology will be used to illustrate approaches of science in understanding the universe. The role of science in modern society and the impact of human civilization on other organisms will be considered. Designed to satisfy the general education requirements for life science. 3 lectures. *Brum, Castro, Quinn, Roche, Troncale, Staff.*

BIO 111 Life Science Laboratory (1) FWSpSu

An optional laboratory to accompany BIO 110. A basic understanding of living organisms will be achieved through experiments and demonstrations. This course will satisfy the general education requirements for a laboratory course, 1 three-hour laboratory. Prerequisite: BIO 110 or concurrent enrollment in BIO 110.

BIO 115 Basic Biology (5) FWSpSu

Introduction to living things; basic structure and function of plants and animals and their relationship to the physical world. Designed as a prerequisite course for majors who take other courses in Biological Sciences. 3 lectures, 2 three-hour laboratories. *Arnold, Brown, Roche, Sperry, Staff.*

BIO 200 Special Problems for Lower Division Students (1-2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Enrollment requires: 1. Prior arrangement with a faculty member. 2. Completion of a supervisory form available only in the Biological Sciences Department office. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff.*

BIO 201 Environmental Conservation (3) FWSpSu

Contemporary environmental issues, and conservation of natural resources. Topics include ecological concepts, population, food, energy, water, wildlife, land use, and pollution. 3 lectures. Prerequisite: BIO 110, 115 or equivalent. *Erspamer, Quinn, Stewart.*

BIO 213 Principles of Evolution (4) FWSpSu

Introduction to plant and animal evolution. 4 lectures. Prerequisite: BIO 110, 115, or equivalent. *Firstman, Troncale.*

BIO 220 Introduction to Marine Biology (4) FW

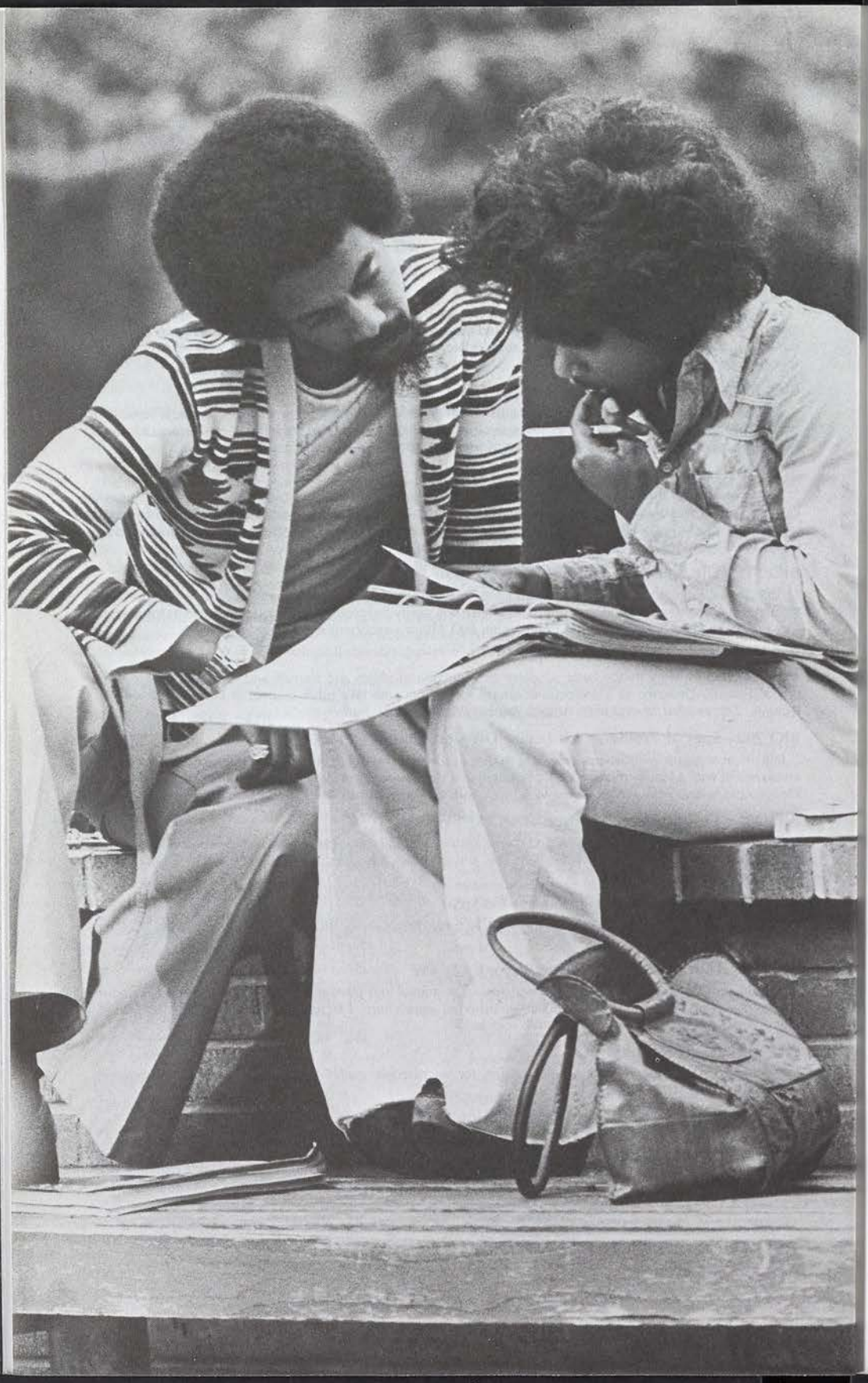
Introduction to life in the oceans. General survey of animal and plant groups, ecology of the major marine environments, and influence of man: pollution, fisheries, aquaculture. 3 lectures, 1 Lab (including weekend field trips). *Arnold, Baskin, Castro.*

BIO 225 Microtechnique (3) W

Methods of preparing plant and animal tisues for microscopic study. 1 lecture. 2 three-hour laboratories. Prerequisite: BIO 115. *Campbell, Erspamer.*

BIO 299 Special Topics for Lower Division Students (1-4) (FWSpSu)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both. *Staff.*



BIO 300 Human Heredity (4) FWSp

Nontechnical introduction to hereditary principles with emphasis on man and society. Eugenics, hereditary diseases, blood types, mutation, radiation, and evolution. For non-majors. 4 lectures. Not open to students with credit for BIO 303. Prerequisite: BIO 110 or equivalent. *Brown, Mortinek.*

BIO 301 Human Sexuality (4) FWSpSu

Frank and factual coverage of human sexuality through discussions, lectures, films and guest speakers. Topics include sexual response and orgasm; myths and misconceptions; birth control; sex and the law; fertilization, pregnancy, and childbirth; diseases and dysfunctions; sex and drugs; genital structure and recent developments in the study of human sexuality. 4 lectures. *Adler, Daniel, McKane, Steele.*

BIO 303 Genetics (4) FWSpSu

Principles of heredity. 4 lectures. Prerequisite: BIO 110 or 115. *Campbell, Martinek, Troncale.*

BIO 305 Aquatic Ecology for Environmental Engineers (4) F

Ecological principles and their application to productivity, pollution, and other problems with emphasis on natural and man-made aquatic habitats. 4 lectures. Prerequisite: BIO 110 or equivalent. *Mercer.*

BIO 306 Biological Systematics (3) FWSp

Interpretation of biological variability; kinds and origins of organismic variation, the species and speciation, phylogenetic inference, classification and nomenclature. 3 lectures. Prerequisite: BOT 125, ZOO 137, 138; recommended: BIO 213, 303, 325. *Clark, Edmonds.*

BIO 325 Principles of Ecology (4) FWSpSu

A study of ecosystems; the interactions between organisms and environment. 3 lectures, 1 three-hour laboratory. 3 one-day weekend field trips. Prerequisite: BIO 115. *Moriarty, Quinn, Szijj.*

BIO 400 Special Problems for Upper Division Students (1-2) FWSpSu (Also, BOT, MIC, or ZOO 400)

Individual or group investigation, research, studies or surveys of selected problems. Enrollment requires: 1. Prior arrangement with a Faculty member. 2. Completion of a Supervisory form available only from the Biological Sciences Department office. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff.*

BIO 410 Biophysics (3) W

Concepts and mechanisms involved in the interpretation of biological systems. A description of living processes in physical terms. 3 lectures. (See also PHY 410.) Prerequisite: PHY 123 or permission of instructor. *Staff.*

BIO 411 Biometrics (3) FWSp

Methods used in the measurement and evaluation of biological phenomena. Problems encountered in the examination of biological theory in a research context. 3 lectures. Prerequisite: MAT 105, STA 107, and junior standing. *Moriarty.*

BIO 418 Population Ecology (3) F

Factors affecting the abundance and distribution of animal populations in their natural environment. 2 lectures, 1 three-hour laboratory. Prerequisite: BIO 411 and 325. *Szijj.*

BIO 420 Water Pollution Biology (3) F

Major pollutants and their effects on aquatic organisms, human health, and use of water resources. 3 lectures. Prerequisite: consent of instructor. *Mercer.*

BIO 421 Advanced Genetics (3) FWSP

Recent advances in genetics with emphasis on gene structure, function, and regulation. 3 lectures. Prerequisite: BIO 303. *Campbell, Martinek.*

BIO 423 General Cytology (4) F

General structure and ultrastructure of the cell. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 124, ZOO 138. *Daniel.*

BIO 425 Chaparral Biology (4) W

Structure, function, and management of the California chaparral. 3 lectures, 1 three-hour laboratory. Some one-day field trips. Prerequisite: BIO 325. *Quinn.*

BIO 430 Fresh Water Biology (5) Sp

Ecology and natural history of major plant and animal groups in various fresh water habitats, and their relationship to fisheries, wildlife management, water, sanitation, and conservation. 3 lectures. 2 three-hour laboratories. Prerequisite: BOT 125, ZOO 137 or consent of instructor. *Mercer.*

BIO 431 Radiation Biology (5) FSp

Introduction to radioisotope tracer techniques, radiometric analyses, effects of ionizing radiation, radiation safety and health physics as applied to life sciences and public health. 3 lectures, 2 three-hour laboratories. Prerequisite: 12 units of Biological Sciences, 8 units of Chemistry, 8 units of Physics. *Knill.*

BIO 434 Limnology (3) F

Evaluation of physical and biological factors affecting ponds, lakes and streams. 3 lectures. Prerequisite: CE 431 or consent of instructor. *Bath, Mercer.*

BIO 435 Cellular Physiology (4) FSp

Physical mechanisms at the cellular level. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 201 or 211. *Wu.*

BIO 436 History and Philosophy of Biology (4) F

Introduction to the historical relationship between natural philosophy and natural science, with special reference to the life sciences, including a consideration of the development of the scientific method in biology; an overview of the growth of biology in relation to the Western scientific revolution, with special emphasis upon the nineteenth century, including a consideration of humanist values in biology. 4 lectures. *Firstman.*

BIO 440 Biology of Symbiosis (4) W

Physiological, ecological, and behavioral aspects of heterospecific associations, including parasitism, mutualism, and commensalism. 2 lectures, 2 three-hour laboratories. Prerequisite: ZOO 424 or BOT 422, or BIO 435, or consent of instructor. *Castro.*

BIO 441 Internship in Biology (2) FWSpSu

On-the-job training which relates academic and practical experience in student's area of interest. Written evaluation from job supervisor required upon completion. Total credit limited to 6 units. Prerequisite: Internship coordinator approval of student's application for internship credit (form available from Biological Sciences Department). *Staff.*

BIO 442 Marine Ecology (5) Sp

Structure and function of marine ecosystems with emphasis on littoral environments. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 325, or consent of instructor. *Arnold, Castro.*

BIO 450 Concepts of Molecular Biology (4) F

The molecular basis and control mechanisms of biological processes such as information processing, energy processing, assembly of macromolecules into functional units, and evolution of macromolecules. 4 lectures. Prerequisite: Consent of instructor. *Sperry, Troncale.*

BIO 451 Molecular Biology Techniques (5) W

Principles and practice of major techniques used in isolation and characterization of biologically important macromolecules, with primary emphasis on centrifugation, chromatography, and electrophoresis. 3 lectures, 2 three-hour laboratories. Prerequisite: Consent of instructor. *Sperry, Troncale.*

BIO 460 Air Pollution Problems (3) F

Concepts of air pollution; major air pollutants; sources; effects on plants and animals and materials; controls; future problems. 3 lecture-discussions. Prerequisite: senior standing and consent of instructor. *Ames.*

BIO 461, 462 Senior Project (2) (2) FWSpSu

Research conducted under faculty supervision. Written thesis in accordance with professional standards required upon completion of project. Total credit limited to 6 units. Recommended for students in any of the four biological sciences majors contemplating graduate or professional school training. Prerequisite: Written consent of student's research advisor prior to enrolling. *Staff.*

BIO 490 Senior Seminar (1) FWSpSu

Oral and written presentation of selected topics in biology. Must be taken twice for graduation in biological sciences majors. Prerequisite: Senior standing. *Staff.*

BIO 499 Special Topics for Upper Division Students (1-4) FWSpSu

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both. *Staff.*

Graduate courses are listed in the graduate section of the catalog.

BOTANY

One of the four majors offered in the biological sciences department is botany. For other programs in this department see biology, microbiology, and zoology.

Don C. Force, *Chair*
Gilbert D. Brum, *Coordinator*

Ralph W. Ames	Jerome E. Dimitman
Vivienne N. Armentrout	Jack L. Erspamer
Lawrence M. Blakely	Edward K. Mercer
J. Curtis Clark	Martin F. Stoner

The botany curriculum offers a four-year sequence of foundation courses plus electives to provide the fundamentals of plant sciences as well as the necessary flexibility to permit selection of courses for several lines of study. Such versatility covers the major disciplines of plant science—physiology, morphology and systematics, and also provides for careers in mycology, pathology, ecology, field biology, plant biotechnology and similar occupational areas which require a strong background of basic plant studies.

Of considerable advantage to the program are the various distinct plant communities, from the coastal strand through desert regions to sub-alpine meadows, available nearby for field study.

Other centers of botanical study and resources close at hand include the Los Angeles State and County Arboretum, Huntington Botanical Garden, and the Rancho Santa Ana Botanic Garden. In addition, the department maintains one of the largest collections of fungi in the West—the C. J. Humphrey Mycological Herbarium.

The botany section also offers a curriculum leading to the Master of Science in Biology degree with an emphasis in botany.

CORE COURSES FOR MAJOR

(Required of all students)

Principles of Evolution	BIO	213	(4)
Genetics	BIO	303	(4)
Principles of Ecology	BIO	325	(4)
Senior Seminar	BIO	490	(1,1)
Plant Structures and Functions	BOT	124	(5)
Plant Morphology	BOT	125	(5)
Gen. Plant Pathology	BOT	323	(4)
Plant Taxonomy	BOT	343	(4)
Plant Ecology	BOT	421	(4)
Plant Physiology	BOT	422	(5)
Phycology	BOT	433	(4)
or Mycology	BOT	425	
or Mycology	BOT	426	
Plant Anatomy	BOT	435	(4)
Basic Microbiology	MIC	201	(5)
Invertebrate Zoology	ZOO	137	(5)
Vertebrate Zoology	ZOO	138	(5)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

College Chemistry	CHM	106	(3)
College Chemistry Lab	CHM	142	(1)
College Chemistry Lab	CHM	143	(1)
Organic Chemistry	CHM	201	(3)
Organic Chemistry Lab	CHM	250	(1)
Elements of Biochemistry	CHM	321	(4)
Technical Calculus	MAT	130	(4)
College Physics	PHY	121	(3)
College Physics	PHY	122	(3)
College Physics	PHY	123	(3)
College Physics Lab	PHY	141	(1)
College Physics Lab	PHY	142	(1)
College Physics Lab	PHY	143	(1)
Basic Soil Science	SS	231	(4)
Intro to Entomology	ZOO	226	(4)
Approved Electives		**	(21)
Free Electives			(4)

Students considering graduate work or professional schools, see recommended courses for preprofessional preparation.

** Approved electives include all 200, 300, and 400 level courses in the Biological Sciences Department not specifically designed for non-majors. See advisor for approval of courses offered by other departments.

GENERAL EDUCATION REQUIREMENTS

Category I: (Pattern 2)			
A. Freshman Composition	ENG	104	(4)
B. Advocacy and Argument	SP	204	(4)
C. Freshman Composition	ENG	105	(4)
Category II: (Pattern 1)			
A. College Algebra	MAT	105	(4)
B. College Chemistry	CHM	104	(3)
College Chemistry Laboratory	CHM	141	(1)
C. Basic Biology	BIO	115	(5)
D. College Chemistry	CHM	105	(3)
Category III: Select one course from each area. Minimum total			(12)
Category IV: Select one course from each area. Minimum total			(12)
Category V: Select one of following: CPU 201, CPU 202 *or* PSY 201			(4)
Category VI: Select one course from each area. Minimum total			(8)
Category VII: *Upper Division—minimum*			(8)

(An additonal 4 unit upper division course must be taken to replace a CAT. III or IV lower division course SEE ADVISOR)

BOTANY MINOR

Required Courses (all students)
Minimum units—32
Minimum upper division units—9

Basic Biology	BIO	115	(5)
Plant Structures and Functions	BOT	124	(5)
and Plant Morphology	BOT	125	(5)
and 6 units of BOT prefix courses not including BOT 316			

At least three of the following courses must be completed:

Plant Pathology	BOT	323	(4)
Plant Taxonomy	BOT	343	(4)
Plant Ecology *	BOT	421	(4)
Plant Physiology **	BOT	422	(5)
Plant Anatomy	BOT	435	(4)

Any of the following courses may be used to complete the minor:

Principles of Evolution	BIO	213	(4)
Genetics	BIO	303	(4)
Principles of Ecology	BIO	325	(4)
Plant Nematology	BOT	423	(3)
Advanced Plant Pathology	BOT	424	(4)
Mycology	BOT	425	(4)
Mycology	BOT	426	(4)
Phycology	BOT	433	(4)
Morphology of Embryophytes	BOT	434	(5)
Advanced Plant Taxonomy	BOT	436	(3)
Plant Tissue Culture	BOT	456	(3)
Elements of Organic Chemistry	CHM	201	(3)
Organic Chemistry ***	CHM	211	(3)

* Prerequisite: BIO 325.

** Prerequisite: CHM 201 or consent of instructor.

*** CHM 251 must be taken concurrently.

Note: This minor may not be earned by Botany majors, nor can both Botany and Plant Pathology minors be earned by one student.

PLANT PATHOLOGY MINOR

May be taken by students majoring in Botany.

Required Courses (all students)
Minimum units—32
Minimum upper division units—9

Basic Biology	BIO	115	(5)
Plant Structures and Functions	BOT	124	(5)
Plant Pathology	BOT	323	(4)
Plant Anatomy	BOT	435	(4)

At least four of the following courses must be completed:

Plant Morphology	BOT	125	(5)
Crop Diseases	AGR	421	(4)
Citrus Diseases **	FI	226	(4)
Diseases of Ornamental Plants	OH	327	(4)
Plant Physiology *	BOT	422	(5)
Plant Nematology	BOT	423	(3)
Advanced Plant Pathology	BOT	424	(4)
Mycology	BOT	425	(4)
Mycology	BOT	426	(4)

* Prerequisite: CHM 201 or consent of instructor.

** Prerequisite: FI 102.

Course Descriptions

F, W, Sp and Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified, the course is offered each year during the indicated quarter(s). Parentheses signify that the course *may* be offered during the quarter(s) they enclose. When appropriate, the names of faculty associated with each course are specified; otherwise "Staff" is noted.

BOT 112 The World of Plants (4)

The biology of Plants, their role in the ecosystem, and their importance in human civilization. 3 lectures, 1 3-hour laboratory. *Staff*

BOT 120 Elements of Botany (4) FWSp

Principles of structure, function, and classification of seed plants and fungi with special application to agriculture. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 115. *Brum*

BOT 124 Plant Structures and Functions (5) FWSpSu

Introduction to the relationship between the structures of plants and their functions. Topics also include plant classification, genetics, growth and development, evolution and ecology. Emphasis on flowering plants. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Brum*

BOT 125 Plant Morphology (5) FWSpSu

Comparative morphology and phylogenetic relationships of plant groups from bacteria to angiosperms. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Ersparner*

BOT 200 Special Problems for Lower Division Students (1-2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Enrollment requires: 1. Prior arrangement with a faculty member. 2. Completion of a Supervisory form available only in the Biological Sciences Department Office. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff*

BOT 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instructure is by lecture, laboratory, or a combination of both. *Staff*

BOT 307 Plants and People (4) (W)

Natural history and uses of plants important to people. Open to all majors. 3 lectures plus field activity. *Stoner*

BOT 316 Plant Environments (4) FW

Effects of environmental factors on the growth and distribution of plant materials used in landscaping. Not open to majors in the Biological Sciences Department. 3 lectures, 1 three-hour laboratory. *Brum*

BOT 323 General Plant Pathology (3) FWSp

Principles of the nature, diagnosis, and control of plant diseases caused by bacteria, fungi, nematodes, viruses, and physiological factors. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 124 or 125. *Armentrout, Dimitman, Stoner*

BOT 343 Plant Taxonomy (4) Sp

Principles of classification and nomenclature of plants, with emphasis on the angiosperms. Identification of California native flowering plants.2 lectures, 2 3-hour laboratories. Required field trips. Prerequisites: BOT 124; recommended: BOT 125, BIO 213. *Clark*

BOT 400 Special Problems for Upper Division Students (1-2) FWSpSu

Individual or group investigation, research, studies, or surveys of selected problems. Enrollment requires: 1. Prior arrangement with a faculty member. 2. Completion of a Supervisory form available only in the Biological Sciences Department office. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff*

BOT 421 Plant Ecology (4) Sp

A survey of the interactions between plants and the environment. Examination of the classification, development and structure of major vegetation types, plant communities and ecosystems. Introduction to the effects of climate, soil and animals on plant growth, development, reproduction and distribution. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 325. *Brum*

BOT 422 Plant Physiology (5) FWSp

Life processes of plants; water relations; nutrition and metabolism; growth and development. 3 lectures, 2 three-hour laboratories. Prerequisites: CHM 105 and BOT 124. *Blakely, Wu*

BOT 423 Plant Nematology (3) W

Classification of nematodes associated with economic plants; basic morphology, biology and control of important plant parasitic nematodes. 2 lectures, 1 three-hour laboratory. Prerequisite: BIO 115. *Mercer*

BOT 424 Advanced Plant Pathology (4) Sp (Su)

Discussion of current topics in plant pathology; experience in the diagnosis of diseases and in methods for the study of pathological problems. 2 lectures, 2 three-hour laboratories. Field trips may be required. Prerequisite: BOT 323. *Armentrout, Dimitman, Stoner*

BOT 425 Mycology (4) F

Morphology, physiology, culture, pathology, taxonomy, and general biology of Acrasiales, Labyrinthulales, Myxomycetes, Oomycetes, and Zygomycetes. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 120 or 125 or consent of instructor. *Stoner*

BOT 426 Mycology (4) W

Morphology, physiology, culture, pathology, taxonomy and general biology of Ascomycetes, Deuteromycetes, and Basidiomycetes. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 120 or 125 or consent of instructor. *Stoner*

BOT 433 Phycology (4) F

Morphology, taxonomy, ecology, and physiology of the fresh-water and marine algae. Culture work, collection, and identification emphasized in the laboratory. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 125, MIC 201. *Arnold*

BOT 434 Morphology of Embryophytes (5) W

Evolution of the embryophytes as illustrated by the comparative morphology, life patterns and relationships of the liverworts, mosses, and vascular plants. 3 lectures, 2 three-hour laboratories. Prerequisite: BOT 125 or consent of the instructor. *Erspamer*

BOT 435 Plant Anatomy (4) W

Microscopic study of representative common plants dealing with origin, development, and structure of cells, tissues and tissue systems in roots, stems, and leaves. 2 lectures, 2 three-hour laboratories. Prerequisite: BOT 120 or BOT 124. *Erspamer*

BOT 436 Advanced Plant Taxonomy (3) F

Phylogeny of the vascular plants; techniques for taxonomic research. 2 lectures, 1 three-hour laboratory. Prerequisite: BOT 343. *Clark*

BOT 456 Plant Tissue Culture (3) Sp

Methods and applications, including: selection and sterilization of explants; preparation and sterilization of media; sterile techniques; incubation of cultures; review of literature. 1 lecture, 2 three-hour labs. Prerequisite: BOT 422. *Blakely*

BOT 499 Special Topics for Upper Division Students (1-4) FWSpSu

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

CHEMISTRY

Victor P. Abegg, *Chair*

Philip Beauchamp
Fredrick Bet-Pera
Charles Bowen
Ruth J. Bowen
David Brown
Vasu Dev
Elisheva Goldstein
George Gutnikov
David A. Haner
Paul C. Hiemenz
Yu-Ping Hsia
Walter Maya
Charles Millner
Patrick W. Mobley
Scott E. Pattison
Earl L. Pye
Elmer H. Rice
J. Ernest Simpson
Donald D. Smith
Arnulf Vollmar

The chemistry department offers a flexible program of studies designed to prepare students for careers in private industry and government or for highly diverse graduate study. Students may direct their efforts into all the major areas of chemistry and into certain interdisciplinary areas. This is accomplished by two possible rigorous tracks or options of study, both leading to the Bachelor of Science degree in Chemistry.

The "chemistry" option emphasizes the chemistry-physics interface. The curriculum of this option leads to the more traditional careers and graduate programs in chemistry. This degree will be certified by the American Chemical Society as having met its standards for professionalism at the baccalaureate level.

The "chemical sciences" option stresses the growing body of knowledge at the chemistry-life sciences interface. Beyond the core curriculum students may pursue programs in the chemistry of plants, animals, or human beings (biochemistry, clinical chemistry, marine biochemistry, pre-medicine, pre-dentistry, etc.). Upon consultation with a departmental advisor, the student may select courses from a list of restricted electives thereby achieving a program meeting that individual's career goals.

Chemistry majors following either the Chemistry or Chemical Sciences Option are reminded that up to 16 units of credit can be earned for approved work experience under the heading of Cooperative Education. Additional details will be found listed at the beginning of the School of Science section of this catalog.

The department also offers a minor in chemistry to students from other majors. This should be of special interest to non-chemistry majors whose curriculum already involves substantial chemistry requirements, such as chemical engineering, microbiology and pre-professional majors.

Students interested in becoming members in the American Chemical Society may join the Student Affiliate of the American Chemical Society. Additional information can be obtained from the Chemistry Department.

A curriculum leading to the Master of Science degree in Chemistry is offered in the department. For an undergraduate student who initiates a program with an advisor during the junior year, the possibility exists for completing the Master's degree by the end of the fifth year. Requirements for this degree may be found in the graduate listings.

CORE COURSES FOR MAJOR

(Required of all students)

General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry	CHM	113	(3)
General Chemistry Lab	CHM	151	(1)
General Chemistry Lab	CHM	152	(1)
General Chemistry Lab	CHM	153	(1)
Quantitative Analysis	CHM	221	(4)
Organic Chemistry	CHM	314	(3)
Organic Chemistry	CHM	315	(3)
Organic Chemistry	CHM	316	(3)
Organic Chemistry Lab	CHM	317	(1)
Organic Chemistry Lab	CHM	318	(1)
Organic Chemistry Lab	CHM	319	(1)
Organic Analysis	CHM	335	(2)
Spectroscopic Methods I	CHM	342	(2)
Separation Methods	CHM	344	(2)
Electrochemical Methods I	CHM	345	(2)
Physical Chemistry Lab	CHM	352	(2)
Senior Project	CHM	461	(2)
Senior Project	CHM	462	(2)
Undergraduate Seminar	CHM	463	(2)

One of the following:

Spectroscopic Methods II	CHM	343	(2)
Electrochemical Methods II	CHM	346	(2)
Theory of Chemical Instrumentation	CHM	347	(2)

Advanced Chemistry Electives ..... (6)
(Two courses, 400-level or higher excluding CHM 400, 461, 462, 463, 499.)

OPTION COURSES FOR MAJOR

(Required for specific options)

CHEMISTRY

Physical Chemistry	CHM	311	(4)
Physical Chemistry	CHM	312	(3)
Physical Chemistry	CHM	313	(3)
Physical Chemistry Lab	CHM	353	(2)
Biochemistry	CHM	327	(4)
and Biochemistry	CHM	328	(4)
or Inorganic Chemistry	CHM	401	(3)
and Inorganic Chemistry	CHM	402	(3)

CHEMICAL SCIENCES

Physical Chemistry	CHM	304	(4)
Physical Chemistry	CHM	305	(3)
Biochemistry	CHM	327	(4)
Biochemistry	CHM	328	(4)
Biochemistry	CHM	329	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Basic Biology	BIO	115	(5)
Freshman Composition	ENG	104	(4)
Calculus & Analytic Geom	MAT	114	(3)
Calculus & Analytic Geom	MAT	115	(3)
Calculus & Analytic Geom	MAT	116	(4)
General Physics	PHY	131	(3)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Phy Lab	PHY	151	(1)
General Phy Lab	PHY	152	(1)
General Phy Lab	PHY	153	(1)

Additional G.E.:
2 courses in GE I (B&C)
1 course in each area GE III**
1 course in each area GE IV
1 course in GE V
Upper Division***
(An additional 4 upper div. units are to come from Cat. III or IV. These replace lower div units in each area)

CHEMISTRY OPTION

Differential Equations	MAT	216	(4)

Two Physics Courses 200-level or higher excluding PHY 200, 299, 400, 499 ..... (6)
or
Computer Science 205 and any other CS course except 200, 250, 299, 400, 461, 462, 463, 499 ..... (8)
Electives, unrestricted ..... (31–35)

CHEMICAL SCIENCES OPTION

*** Electives, restricted ..... (15–20)
Electives, unrestricted ..... (24–29)

** A reading knowlege of a foreign language, especially German, is strongly recommended for students planning advanced study in science.

*** Consult the chemistry department for details and restrictions.

CHEMISTRY MINOR

College Chemistry	CHM	104	(3)
or General Chemistry	CHM	111	(3)
College Chemistry	CHM	105	(3)
or General Chemistry	CHM	112	(3)
College Chemistry	CHM	106	(3)
or General Chemistry	CHM	113	(3)
College Chemistry Lab	CHM	141	(1)
or General Chemistry Lab	CHM	151	(1)
College Chemistry Lab	CHM	142	(1)
or General Chemistry Lab	CHM	152	(1)
College Chemistry Lab	CHM	143	(1)
or General Chemistry Lab	CHM	153	(1)
Organic Chemistry Elements	CHM	201	(3)
or Organic Chemistry	CHM	314	(3)
Organic Chemistry Elements Lab	CHM	250	(1)
or Organic Chemistry Lab	CHM	317	(1)
Quantitative Analysis	CHM	221	(4)
Physical Chemistry Fundamentals	CHM	301	(4)
or			
Elements of Physical Chemistry	CHM	304	(4)
or Physical Chemistry	CHM	311	(4)
**** Chemistry Electives			(5)

**** Two courses 300-level or higher excluding CHM 400, 461, 462, 463, 499.

Course Descriptions

The notations F, W, Sp, Su, and even or odd indicate which quarter(s) of even or odd numbered calendar years the course is normally offered. Courses not designated "even" or "odd" are offered each year.

CHM 101 Consumer Chemistry (4) FWSpSu

Introduction to atoms, molecules and bondings. Petrochemicals, plastics and fibers. Air and water pollution. Body chemistry, foods, drugs, and poisons. Chemical and nuclear energy. Not open to students who have credit for CHM 103, 104 or 111. 3 lectures, 1 recitation.

CHM 103 Fundamentals of Chemistry (4) FWSpSu

Atoms, molecules and physical states of matter. Important classes of chemical compounds and chemical reactions. Experimentation as the approach to solving problems of natural phenomena. Not open to students who have credit for CHM 104 or 111. 3 lectures, 1 recitation.

CHM 104, 105, 106 College Chemistry (3) (3) (3) FWSpSu

Principles of atomic structure, periodicity, stoichiometry, gases, solutions, acids and bases, equilibrium, oxidation-reduction, electrochemistry, thermodynamics and their applications to the life sciences and agricultural sciences. To be taken in sequence. For majors not requiring calculus. Prerequisite to CHM 104: high school chemistry or CHM 103 and high school algebra. Concurrent: CHM 141, 142, 143, respectively.

CHM 111, 112, 113 General Chemistry (3) (3) (3) FWSpSu

Atomic theory of structure and bonding, chemical equations, gas laws, oxidation-reduction, electrochemistry, states of matter, equilibrium, acids and bases, thermodynamics and reaction kinetics and their applications to chemistry, physics, and engineering sciences. For majors requiring calculus. To be taken in sequence. Prerequisite to CHM 111: high school chemistry or CHM 103 and high school algebra. Concurrent: CHM 151, 152, 153, respectively.

CHM 141, 142, 143 College Chemistry Laboratory (1) (1) (1) FWSpSu

Laboratory to accompany College Chemistry lecture series. Experiments in stoichiometry, acid-base, pH and redox titrations, simple quantitative analysis, gas measurements, ionic equilibria, and qualitative analysis. To be taken in sequence concurrently with CHM 104, 105, 106, respectively.

CHM 151, 152, 153 General Chemistry Laboratory (1) (1) (1) FWSpSu

Laboratory to accompany General Chemistry lecture series. Experiments in basic quantitative analysis techniques, gas measurements, acid-base, pH, and redox titrations, electrochemistry, kinetics, thermodynamics, and ionic equilibria and qualitative analysis procedures. To be taken in sequence concurrently with CHM 111, 112, 113, respectively.

CHM 200 Special Problems for Lower Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CHM 201 Elements of Organic Chemistry (3) FWSpSu

The fundamental concepts of organic chemistry with emphasis on practical applications. For students who are required to take one quarter of organic chemistry. Not open for credit to chemistry majors. 3 lectures. Prerequisite: CHM 105 or 112. Concurrent: CHM 250 for students planning to take CHM 321.

CHM 221 Quantitative Analysis (4) FWSpSu

Fundamentals of gravimetric and volumetric analysis. Focus on laboratory work, with class discussion supplying supporting theory. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 106 or 113.

CHM 250 Elements of Organic Chemistry Laboratory (1) FWSpSu

Introduction to general techniques of the organic laboratory for the separation, purification, and identification of organic substances. Survey of the laboratory preparation and reactions of different functional groups with emphasis on the practical application. 1 three-hour laboratory. Not open for credit to chemistry majors. Prerequisite: CHM 105 or 112. Concurrent: CHM 201.

CHM 256 Glassblowing (1) Sp

Fundamental techniques of laboratory glassblowing. A practical course to teach students to construct and repair special pieces of glass apparatus used in advanced chemistry courses and senior project work. 1 three-hour laboratory, scheduled by arrangement.

CHM 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

CHM 301 Fundamentals of Physical Chemistry (4) FSp

Thermodynamic properties of chemical species and their application; kinetics, measurements of physical properties of molecules. Not open to students whose majors require CHM 304 or CHM 311. 3 lecture-problems, 1 recitation. Prerequisite: CHM 106 or 113.

CHM 304, 305 Elements of Physical Chemistry (4) (3) F, W

A two-quarter survey of physical chemistry covering properties of gases, chemical thermodynamics, solutions, electrochemistry, reaction kinetics, and atomic and molecular structure. To be taken in sequence. 3 lecture-problems, 1 recitation for 304, 3 lecture problems for 305. Prerequisite: MAT 116, CHM 113, PHY 133, or their equivalents. Concurrent with CHM 305: CHM 352.

CHM 306 History and Philosophy of Chemistry (4) W

The history of chemistry from antiquity to the present, with special emphasis on the scientific revolution. Four one-hour lectures per week. No prerequisites except Junior standing.

CHM 311, 312, 313 Physical Chemistry (4) (3) (3) FSu, WSu, SpF

Properties of gases, kinetic molecular theory, chemical thermodynamics, phase equilibria, solutions, electrochemistry, chemical kinetics, atomic and molecular structure, molecular spectroscopy, photochemistry, colloids and macromolecules. To be taken in sequence, 3 lecture-problems, 1 recitation for CHM 311 and 3 lecture-problems for CHM 312 and 313. Prerequisite: MAT 216 or the equivalent. CHM 106 or 113 and one year of college physics.

CHM 314, 315, 316 Organic Chemistry (3) (3) (3) FWSpSu

Modern concepts of chemical bonding, molecular structure, principles of stereochemistry and conformation, reaction mechanisms and synthetic pathways. All common classes and substituents of organic compounds treated. Carbohydrates, heterocyclics, and other biologically significant compounds may be introduced. To be taken in sequence. Prerequisite: CHM 106 or 113. Concurrent: CHM 317, 318, 319, respectively for chemistry majors.

CHM 317 Organic Chemistry Laboratory (1) FWSpSu

Introduction to general techniques of the organic laboratory for the separation, purification and identification of organic substances. Interpretation of IR spectra of organic compounds. 1 three-hour laboratory. Prerequisite: CHM 106 or 113. Concurrent: CHM 314

CHM 318 Organic Chemistry Laboratory (1) FWSpSu

Application of reaction mechanisms toward the synthesis of organic molecules. Interpretation of IR and NMR spectra of organic molecules. 1 three-hour laboratory. Prerequisite: CHM 317. Concurrent: CHM 315

CHM 319 Organic Chemistry Laboratory (1) FWSpSu

Multistep syntheses. Extensive interpretation of IR and NMR spectra of organic compounds. 1 three-hour laboratory. Prerequisite: CHM 318. Concurrent: CHM 316

CHM 321 Elements of Biochemistry (4) FWSp

The fundamental concepts of biochemistry with emphasis on structure-function relationships as they relate to carbohydrates, lipids, proteins, and nucleic acids. Designed for students who are required to take one quarter of biochemistry. Not open for credit to Chemistry majors. 3 lecture-problem, 1 three-hour laboratory. Prerequisite: CHM 201 and 250, or CHM 315 and 317.

CHM 327, 328, 329 Biochemistry (4) (4) (4) FW, WSp, SpSu

Chemistry of carbohydrates, lipids, proteins, nucleic acids, and other classes of substances found in living tissues. Enzyme reactions and kinetics; the function of vitamins and their mechanism of action; and nutritional chemistry. Laboratory work includes study of tissue extracts and instrumental methods in biochemistry. Each course: 3 lecture-problems, 1 three-hour laboratory. To be taken in sequence. Prerequisite to CHM 327, CHM 315 and 317.

CHM 331 Clinical Chemistry (4) Wsp

Introduction to the principles and procedures used in the clinical laboratory for the analysis of blood and urine specimens. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 221 and 327 or 321.

CHM 335 Organic Analysis (2) FSp

Structure determination of organic compounds by elemental and functional group analysis using classical methods and modern chromatographic and spectroscopic methods. 2 three-hour laboratories. Prerequisites: CHM 316 and 319.

CHM 340 The Chemist in Industry (4) FSp

Survey of roles and expectations for chemists in industry and applications of chemical reactions and principles in the petroleum, pharmaceuticals, food, inorganics, polymers, aerospace, and metal industries. Interfaces with economics, patents, chemical engineering, and communication. Guest speakers and plant visits. 3 lecture-problems plus a minimum of 3 plant trips. Prerequisite: CHM 316 and 305 or 312, or consent of instructor.

CHM 342 Spectroscopic Methods I (2) F

Introduction to instrumental analysis based on optical methods such as UV and visible spectroscopy, emission and atomic absorption spectroscopy, and fluorometry. 1 lecture, 1 three-hour laboratory. Prerequisite: CHM 221.

CHM 343 Spectroscopic Methods II (2) W

Instrumental methods of analysis such as nuclear magnetic resonance, electron spin resonance, x-ray diffractometry and fluorometry, electron spectroscopy. 1 lecture, 1 three-hour laboratory. Prerequisite: CHM 342.

CHM 344 Speparation Methods (2) F

Introduction to chemical methods of separation, with emphasis on various forms of chromatography such as gas, liquid, planar, and ion-exchange. 1 lecture, 1 three-hour laboratory. Prerequisite: CHM 221.

CHM 345 Electrochemical Methods I (2) W

Introduction to instrumental analysis based on electrochemical methods such as potentiometric, coulometric, polarographic, and electrogravimetric. 1 lecture, 1 three-hour laboratory. Prerequisite: CHM 221.

CHM 346 Electrochemical Methods II (2) Sp

Instrumental methods of analysis based on voltametric techniques (a.c., pulse, cyclic stripping) and amperometric titration. 1 lecture, 1 three-hour laboratory. Prerequisite: CHM 345.

CHM 347 Theory of Chemical Instrumentation (2) Sp

Theory of chemical instrument systems with emphasis on the selection of instrumentation appropriate to a measurement or control problem. 1 lecture, 1 three-hour laboratory. Prerequisite: CHM 345.

CHM 352 Physical Chemistry Laboratory (2) W

Laboratory experiments illustrating principles of physical chemistry. 2 three-hour laboratories. Prerequisite: CHM 221, 304 or 311. Concurrent: CHM 305 or 312.

CHM 353 Physical Chemistry Laboratory (2) Sp

Advanced laboratory applications of physical chemistry. 2 three-hour laboratories. Prerequisite: CHM 352. Concurrent: CHM 313.

CHM 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CHM 401 Inorganic Chemistry (3) F

Detailed study of theories of bonding in inorganic compounds, with emphasis on coordination complexes, inorganic stereochemistry; uncommon oxidation states; study of relationship of properties to electronic structure. 3 lecture-problems. Prerequisite: CHM 305 or CHM 313.

CHM 402 Inorganic Chemistry (3) W

Mechanisms of inorganic reactions with special emphasis on coordination chemistry. Isomerization and racemization reactions. Free radical reactions. Catalytic effects of coordination compounds. 3 lecture-problems. Prerequisite: CHM 401.

CHM 405 Advanced Organic Chemistry (3) F

An integrated senior course in organic chemistry. Discussions of mechanism, synthetic methods, and structure determinations. Chemical reactivity and molecular structure; rearrangements; carbonyl condensation reactions; electrophilic and nucleophilic additions and substitutions; eliminations; and oxidation-reduction. 3 lecture-problems. Prerequisite: CHM 316, 305 or 313 recommended.

CHM 409 Polymer Chemistry (3) Sp, odd years

Types of polymers and polymerization reactions; properties of polymer solutions and the determination of molecular weights; elasticity and other bulk properties. 3 lecture-problems. Prerequisite: CHM 316 and 305 or 313.

CHM 411 Reaction Kinetics (3) W

Kinetics and mechanisms of chemical reactions. Transition state theory, collision theory, photochemical excitation and dissociation, homogeneous and heterogeneous catalysis. Analysis and solution of problems. 3 lecture-problems. Prerequisite: CHM 305 or 313.

CHM 413 Introduction to Colloid and Surface Chemistry (3) Sp, even years

Gas-liquid, gas-solid and solid-liquid interfaces. Adsorption and surface area determination. The electrical double layer and its relation to flocculation and electrokinetic phenomena. 3 lecture-problems. Prerequisite: CHM 305 or 313.

CHM 415 Chemical Thermodynamics (3) F

Fundamental aspects of chemical thermodynamics, including the first, second, and third laws. Studies of chemical and phase equilibria, enthalpy, entropy, work, and free energy. Relationship to molecular structure and statistical mechanics. 3 lecture-problems. Prerequisite: CHM 305 or 313.

CHM 419 Introduction to Quantum Chemistry (3) F, even years

Mathematical preliminaries, postulates of quantum chemistry, wave functions for some simple chemical models, the central force problem, the Aufbau principle, hybrid orbitals, approximation methods, Hund's multiplicity rule. 3 lecture-problems. Prerequisite: CHM 305 or 313.

CHM 421 Chemical Separation Methods (4) W, even years

Emphasis on the various chromatographic methods of separation, including gas, liquid, paper, thin-layer, electro, ion exchange and gel chromatographics. Solvent extraction, precipitation, and distillation are also included. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: CHM 344.

CHM 422 Chemical Synthesis (4) F, odd years

Systematic study of the preparation, properties, analysis, and reactions of inorganic and organic compounds. 2 lecture-problems. 2 three-hour laboratories. Prerequisites: CHM 319 and 305 or 313.

CHM 442 X-ray Methods of Analysis (4) W, odd years

Introduction to X-ray spectrometric and diffraction methods of chemical analysis. 2 lectures-problems, laboratory 6 hours per week scheduled by arrangement. Prerequisite: CHM 305 or 313 and CHM 352 or consent of instructor.

CHM 446 Corrosion Chemistry (4) Sp

The basic principles of theoretical and applied electrochemistry as it pertains to corrosion. Thermodynamics and kinetics of oxidation. Aqueous corrosion, stress corrosion, hydrogen cracking, fatigue. Corrosion testing, inhibition, and design. Cathodic and anodic protection, metal and chemical coatings. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: CHM 305 or 313 or consent of instructor.

CHM 451 Enzymology (4) F, even years

The nature of enzymes including enzyme kinetics, mechanisms of enzyme-catalyzed reactions, enzyme inhibitors, classification of enzymes. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: CHM 329 or consent of instructor.

CHEM 318 Thry 451

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CHM 452 Biochemical Preparations (3) W, even years

Isolation of some eight different materials from plant and animal sources, such as a blood protein fraction, a plant nucleic acid, a plant terpene, a hormone preparation, a metabolic intermediate, and a urinary excretion product. 1 lecture-problem, 2 three-hour laboratories. Prerequisite: CHM 329 or consent of instructor.

CHM 461, 462 Senior Project (2) (2) FWSpSu

Selection and completion of a project under faculty supervision. Independent study and introduction to research. A formal report is required. Minimum of 120 hours total time.

CHM 463 Undergraduate Seminar (2) FWSp

A study of current developments in chemistry and a discussion of periodical literature at an appropriate level. 2 lecture-discussions. Prerequisites: All required 300-level chemistry courses.

CHM 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of Instructor. Instruction is by lecture, laboratory, or a combination of both.

Graduate courses are listed in the graduate section of the catalog.

COMPUTER SCIENCE

Bruce Hillam, *Chair*

Purshotam L. Jolly — Chung Lee — Kenneth A. MacDonald

Peter A. Laszlo — Hsun K. Liu — Daniel Nesin

The Computer Science program blends practice and theory in both hardware and software, and it provides an excellent foundation in computer languages, computer architecture, large-scale system software, and the design, analysis, and application of many types of algorithms.

Success in mathematics is a good indicator for success in the Computer Science program. In addition to the supplementary admission criteria published in the catalog section on admissions, first-time freshmen and lower division applicants with fewer than 18 transferable quarter units must have completed high school trigonometry and advanced algebra, and applicants with 18 or more transferable quarter units must have completed a full year of Calculus, Fundamentals of Computer Science (equivalent to CS 105) and FORTRAN course (equivalent to CS 205). High school students should also complete a year of physics and a year of chemistry or biology.

The department also offers a graduate program leading to the M.S. degree. Details are given in the Graduate Studies section of the catalog.

Membership is open to CS majors in the Bits and Chips Computer Club and local chapters of ACM and IEEE, and they may also be invited to joint UPE, the national honor society in computer science.

CORE COURSES FOR MAJOR

(Required of all students)

Fundamentals of Computer Science	CS	105	(4)
FORTRAN	CS	205	(4)
Computer Logic	CS	210	(4)
Data Structures	CS	230	(4)
Data Structures	CS	231	(4)
Assembly Language Programming	CS	264	(4)
Introduction to Numerical Analysis	CS	301	(4)
Algorithmic Languages	CS	320	(4)
Computer Organization	CS	365	(4)
Microcomputer System Design	CS	405	(4)
Programming Languages	CS	408	(4)
Automata Theory	CS	410'	(4)
Automata Theory	CS	411	(4)
Artificial Intelligence	CS	420	(4)
Operating systems	CS	431	(4)
Operating Systems	CS	432	(4)
Translators	CS	440	(4)
Translators	CS	441	(4)
Undergraduate Seminar	CS	463	(2)
Computer Science Electives			(18)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Computer Electronics	ECE	255	(4)
Computer Electronics	ECE	256	(4)
Analytic Geometry and Calculus	MAT	114	(3)
Analytic Geometry and Calculus	MAT	115	(3)
Analytic Geometry and Calculus	MAT	116	(4)
Linear Algebra	MAT	208	(4)
Calculus of Several Variables	MAT	214	(4)
Calculus of Several Variables	MAT	215	(4)
General Physics	PHY	131	(3)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Physics Lab	PHY	151	(1)
General Physics Lab	PHY	152	(1)
General Physics Lab	PHY	153	(1)
Applied Probability Theory	STA	330	(4)
General Education (See Department advisor for courses approved to meet G.E.)			(59)
Electives (unrestricted)			(1)

MINOR IN COMPUTER SYSTEMS ORGANIZATION

Required Courses

Fundamentals of Computer Science	CS	105	(4)
FORTRAN	CS	205	(4)
Computer Logic	CS	210	(4)
Assembly Language Programming	CS	264	(4)
Computer Organization	CS	365	(4)
Microcomputer Systems Design	CS	405	(4)
Theory and Design of Codes	CS	455	(4)

Total units required for the minor: 28

MINOR IN SCIENTIFIC COMPUTER PROGRAMMING

Required Courses

Fundamentals of Computer Science	CS	105	(4)
FORTRAN	CS	205	(4)
Data Structures	CS	230	(4)
Data Structures	CS	231	(4)
Algorithmic Languages	CS	320	(4)
Design and Analysis of Algorithms	CS	331	(4)
Artificial Intelligence	CS	420	(4)

Total units required for the minor: 28

Course Descriptions

CS 101 Introduction to Computers for Non-CS Majors (4)

Introduction to computer use, time-sharing and batch programming, computer hardware and software, flow charting of algorithms, computer applications, social and economic implications. 4 lecture-discussions. Not open to CS majors.

CS 105 Fundamentals of Computer Science (4)

The stored program computer, central processing unit, memory, input/output, control of information flow. Elementary data structures. Problem analysis and algorithm design, flowcharts, structured programming. Numeric and non-numeric applications using a subset of one or more high-level languages. 4 lecture-discussions. Prerequisite: MAT 104 and MAT 105 or equivalent.

CS 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CS 205 Fortran (4)

Representation and storage of integers, reals, characters, constants, variables, expressions, statements, arrays, parameters, and subprograms. Numeric problems, string processing, tape and disk I/O. Program development, documentation, debugging, and testing. 4 lecture-discussions. Prerequisite: CS 101 or CS 105 or equivalent.

CS 210 Computer Logic (4)

Boolean algebra, combinational and sequential logic with applications to computer design. 4 lecture-discussions. Prerequisite: CS 105 or consent of instructor.

CS 230, 231 Data Structures (4) (4)

Graphs and their invariants, algorithms for the solution of path problems, languages and grammars, Markov algorithms. Linear lists, sequential and linked storage allocation. Representation of trees and graphs. Traversing algorithms. Multilinked structures. Sorting techniques. Dynamic storage allocation. 4 lecture-discussions. Prerequisite: CS 205.

CS 233 Data Structures (4)

Algorithmic presentation of data structures and their applications. Not open to CS majors. 4 lecture-discussions. Prerequisite: Fortran or Pascal.

CS 250 Timesharing Programming Using BASIC (4)

Use of the local timesharing system through programming in BASIC. Emphasis on real-time applications involving interaction between person and machine. 4 lecture-discussions. Prerequisite: CS 105 or CS 101, or consent of instructor.

CS 264 Assembly Language Programming (4)

Assembly and machine coding, instruction sets, addressing techniques, subprogram linkage, system I/O, macro definition and conditional assembly, system and utility programs. 4 lecture-discussions. Prerequisite: CS 205.

CS 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

CS 301 Introduction to Numerical Analysis (4)

Error analysis, zeros of a function, systems of linear equations, interpolation, Chebyshev approximation, least squares approximation, numerical integration and differentiation, random processes. 4 lecture-discussions. Prerequisites: CS 205, MAT 215 and MAT 208.

CS 320 Algorithmic Languages (4)

Formal analysis of algorithmic languages with emphasis on Algol or Pascal. 4 lecture-discussions. Prerequisite: CS 205, or consent of instructor.

CS 331 Design and Analysis of Algorithms (4)

Development of algorithms, top-down structured programming, program correctness, backtrack programming, branch and bound methods, efficient algorithm implementation, algorithm complexity analysis. 4 lecture-discussions. Prerequisite: CS 231.

CS 365 Computer Organization (4)

Stored program computer organization, arithmetic/logic algorithms, addressing modes, memory hierarchy, I/O channels, control unit and micro-programming. Comparison of organizations: multiprocessor, timeshare, vector and associative organizations. Data/instruction concurrency. Organization-description methodologies. 4 lecture-discussions. Prerequisites: CS 210, CS 264 and ECE 256.

CS 390 Computer Simulation (4)

Discrete simulation models; MonteCarlo methods; implementation and validation of models; general purpose simulation language GPSS. 4 lecture-discussions. Prerequisite: CS 205 and STA 330, or consent of instructor.

CS 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

CS 405 Microcomputer Systems Design (4)

The methodology of programming, designing, and interfacing microcomputer elements and processes into an integrated microcomputer system. 4 lecture-discussions. Prerequisite: CS 365 and CS 264, or consent of instructor.

CS 408 Programming Languages (4)

Formal definition of programming languages. Global properties of algorithmic languages including scope of declarations, storage allocation, grouping of statements, binding time, subroutines, coroutines. List processing, string manipulation and data description. Run time representation of program and data structures. 4 lecture-discussions. Prerequisites: CS 231, CS 264 and CS 320.

CS 410 Automata Theory (4)

Finite-state accepters, generators, and transducers. Types of grammars and languages, closure properties, ambiguity. Types of tape automata; sequential machines, two-way accepters, pushdown accepters. Regular languages from finite-state machines, context-free languages from pushdown accepters. 4 lecture-discussions. Prerequisites: CS 210 and CS 230.

CS 411 Automata Theory (4)

Context-free and context-sensitive languages, equivalence of grammars, simplification, normal forms, the pumping lemma and applications, decision problems, precedence grammars. Turing machines as accepters and transducers, computable functions and predicates, unsolvable problems. 4 lecture-discussions. Prerequisite: CS 410

CS 420 Artificial Intelligence (4)

Heuristic programming, searching problem spaces, theorem proving programs, game playing programs, decision making programs, question answering programs. 4 lecture-discussions. Prerequisite: CS 231.

CS 431, 432 Operating Systems (4) (4)

Multiprogramming and multiprocessor systems. Mapping and binding of addresses. Storage management. Procedure and data sharing in main storage. Process and resource control. The deadlock problem. Analysis of file structures and file management. 4 lecture-discussions. Prerequisites: CS 231, CS 264.

CS 435 Database Design (4)

Indexed and sequential files, tree structured files. Hierarchial, network, and relational models. Relational algebra and calculus. Information retrieval. Database reliability, security, integrity, and concurrency. 4 lecture-discussions. Prerequisite: CS 231.

CS 440, 441 Translators (4) (4)

Interpreter and compiler structures. Symbol tables, lexical and syntatic scanners, object code generation and optimization. Run-time organization, error diagnostics. 4 lecture-discussions. Prerequisites: CS 231, CS 264.

CS 455 Theory and Design of Codes (4)

Algebra for coding. Sources, encoders, channels, decoders, sinks. Linear block codes, cyclic codes, BCH codes, majority logic decoding, burst and conventional codes. 4 lecture-discussions. Prerequisites: CS 210, MAT 208, STA 330.

CS 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum of 120 hours total time.

CS 463 Undergraduate Seminar (2)

Discussions through seminar methods of new developments in the fields of student's particular interests. 2 lecture-discussions. Prerequisite: Senior standing in computer science.

CS 499 Special Topics for Upper Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

EARTH SCIENCES

Donald W. Tarman, *Chair*

Lawrence J. Herber — Walter H. Hesse — John A. Klasik

Bernard O. Lane — David R. Jessey

The Earth Sciences Department offers two programs leading to either a Bachelor of Science or a Bachelor of Arts degree. The Bachelor of Science program prepares students for graduate school or, direct employment in industry or government as professional geoscientists. The curriculum stresses a background in the physical sciences and mathematics as well as geology itself.

The Bachelor of Arts program offers a flexible curriculum which can be tailored to each student's specific academic goal. Anchored on a minimal number of core and support courses the student's program can be directed into any Earth Science-related career field. The degree is aimed at those individuals who either have a general interest in geology or who have very specific career objectives in fields requiring only general geologic knowledge. Examples of those related career fields are museum curators, environmental technician, Forest Service and National Park Service staff and Earth Science elementary and secondary school teachers. The student's specific bachelor of arts course program must be approved by the faculty advisor as soon as possible after entering the university.

CORE COURSES FOR MAJOR

(Required of all students)

GEOLOGY (BACHELOR OF SCIENCE)

Principles of Geology	ESC	111	(5)
Historical Geology	ESC	112	(4)
Geol. Graphics	ESC	175	(2)
Mineralogy	ESC	215	(5)
Optical Mineralogy	ESC	325	(4)
Invertebrate Paleontology	ESC	331	(4)
Stratigraphy	ESC	332	(4)
Structural Geology	ESC	333	(4)
Sedimentary Petrology	ESC	423	(4)
Igneous and Metamorphic Petrology	ESC	424	(3)
Ig. & Met. Pet	ESC	425	(2)
Economic Geology	ESC	433	(4)
Field Methods	ESC	455	(4)
Senior Project	ESC	461	(2)
Senior Project	ESC	462	(2)
Undergraduate Seminar	ESC	463	(2)
Summer Field Geology	ESC	490	(8)

EARTH SCIENCES (BACHELOR OF ARTS)

Principles of Geology	ESC	111	(5)
Historical Geology	ESC	112	(4)
Mineralogy	ESC	215	(5)
Hand Specimen Petrology	ESC	219	(4)
Senior Project	ESC	461	(2)
Senior Project	ESC	462	(2)
Undergraduate Seminar	ESC	463	(2)
Plus 33 additional credits in Earth Sciences or Earth Science-related courses			(33)

SUPPORT AND ELECTIVE COURSES

(Required of specific options)

GEOLOGY (BACHELOR OF SCIENCE)

Basic Biology	BIO	115	(5)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry	CHM	113	(3)
General Chemistry Lab	CHM	151	(1)
General Chemistry Lab	CHM	152	(1)
General Chemistry Lab	CHM	153	(1)
Intro to Computers	CS	105	(4)
Analytic Geom and Calc	MAT	114	(3)
Analytic Geom and Calc	MAT	115	(3)
Analytic Geom and Calc	MAT	116	(4)
Descriptive Geometry	MFE	125	(2)
General Physics	PHY	131	(3)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Phy Lab	PHY	151	(1)
General Phy Lab	PHY	152	(1)
General Phy Lab	PHY	153	(1)
Basic Soil Sci.	SS	231	(4)
Invertebrate Zoo	ZOO	137	(5)
Statistics	STA	107	(4)
Units to Complete GE			(56)
Electives			(18)

EARTH SCIENCES (BACHELOR OF ARTS)

College Chemistry	CHM	104	(3)
College Chemistry	CHM	105	(3)
College Chemistry	CHM	106	(3)
College Chemistry Lab	CHM	141	(1)
College Chemistry Lab	CHM	142	(1)
College Chemistry Lab	CHM	143	(1)
Trigonometry	MAT	106	(4)
College Algebra	MAT	105	(4)
College Physics	PHY	121	(3)
College Physics	PHY	122	(3)
College Physics	PHY	123	(3)
College Phy Lab	PHY	141	(1)
College Phy Lab	PHY	142	(1)
College Phy Lab	PHY	143	(1)
Intro to Stat	STA	107	(4)
Basic Biology	BIO	115	(5)
Courses to satisfy General Education Requirements			(56)
Electives			(7)
Other electives to be approved by advisor generally in Earth Science related fields; e.g., Soils, Civil Engr., Comput. Sci,, Engr. Graphics, Tech. Writing			(25)

Course Description

F, W, Sp and Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified, the course is offered each year during the indicated quarter(s). Parentheses signify that the course *may* be offered during the quarter(s) they enclose.

ESC 100 Earthquakes (2) FWSp

Subject matter will include: earth materials, historical implications, geographic distribution of seismicity, theories of origin, plate tectonic concepts, earthquake prediction, social aspects of seismicity and prediction, survival during earthquakes, cause of structural damage, construction methods and design to minimize damage, determination of epicenters and magnitudes. 2 lectures, 1 field trip.

ESC 101 Fundamentals of Earth Science (4) FWSp(Su)

The earth's place in the solar system. Geological processes involving the atomosphere, oceans and the earth's crust. 3 lectures, 1 recitation. Not open to students who have credit for ESC 111, 321.

ESC 111 Principles of Geology (3–5) FWSp(Su)

Fundamental geologic processes, general surface features and the earth's interior. Minerals, rocks and structures. 3 lectures, 1 three-hour laboratory and weekend field trips. Laboratory is optional for non-majors. Lecture only—3 units; lecture plus lab—4 units; lecture, lab, and field trips—5 units.

ESC 112 Historical Geology (3–4) FW

Changes in continents and ocean basins, fossil populations during successive geological ages, 3 lectures. May be taken without lab by non-majors.

ESC 115 Introduction to Astronomy (3) FWSP(Su)

A descriptive course dealing with the history of astronomy and the development of the basic laws of planetary motion and gravity. Discusses origin and properties of planets in the solar system. Examines properties of the sun in detail. 3 lecture-discussions.

ESC 116 Introduction to Astronomy (3) FWSp(Su)

Methods, principles and instruments used in astronomical investigations. Examination of physical and chemical properties of stars. Theories as to origin, state and future of the universe. A consideration of man's place in the cosmos. 3 lecture-discussions.

ESC 117 Astronomy Laboratory (1) FWSp

Provide students with experience in the use of refracting, reflecting and solar telescope. Identification and location of planet, constellations and principal stars. Night time meetings and some field trips should be anticipated. 1 three-hour laboratory. Prerequisite: ESC 115 or consent of instructor.

ESC 120 Intro. to Oceanography (3) W, Sp

An introduction in the marine sciences. Dealing primarily with the properties of water, ocean currents, waves, tides, beaches, marine life, marine resources and the nature and origin of the sea floor.

ESC 175 Geological Graphics (2) Winter

Methods and practice in geological illustration with emphasis on structural and stratigraphic presentation. Two 3-hour labs. Prerequisite: ESC 111.

ESC 200 Special Problems for Lower Division Students (1–2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with the maximum of 2 units per quarter.

ESC 215 Mineralogy (5) F

Identification, occurrence, origin and uses of the common rock-forming minerals. Blowpipe and qualitative spectroscopic analysis. Physical and chemical properties of minerals and introductory morphologic crystallography. 3 lectures, 2 three-hour laboratories. Prerequisites: ESC 111 (including lab). Concurrent: CHM 104 and 141, or CHM 111 and 151.

ESC 219 Hand Specimen Petrology (4) W (even years)

Emphasis on rock collecting and field relationships. Rock identification based largely on megascopic properties. Students will be required to make field collections. 2 lectures, 2 three-hour laboratories. Prerequisites: ESC 111 including lab.

ESC 224 Geology of California (4) Sp

Physiography, structure, and geological evolution of California. Origin, occurrence, and uses of metallic and non-metallic ores including oil and water. Problems related to landslides, earthquakes, subsidence, and flood control. 3 lectures, and a minimum of 3 full-day field trips. Prerequisite: ESC 111, or consent of instructor.

ESC 250 Environmental Geology (3) FWSp

Geologic problems related to environment; geologic hazards (landslides, earthquakes, floods); groundwater development, pollution and depletion of natural resources; soil erosion and conservation; human interference with geologic processes; geothermal power. 3 lectures.

ESC 299 Special Topics for Lower Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ESC 300 Introduction to Geochemistry (4) Sp (odd years)

Physiochemical processes governing the distribution and paths of elements in the system earth: lithosphere, hydrosphere, biosphere, and atmosphere. Environment applications to the ecosystem such as the cycling or pathways of elements in toxic substances in solid waste, or contamination in groundwater. 3 lectures, 1 three-hour laboratory. Prerequisites: ESC 111 and 1 year of college chemistry.

ESC 303 Climatology (3) F

Introduction to the weather-producing processes. The earth's heat budget, thermodynamics of the atmosphere, cloud and precipitation mechanisms and the cause of atmospheric circulation. 3 lectures.

ESC 304 Meteorology (3) W

Structure of the atmosphere and its composition. Atmospheric measurements used for determining weather. Atmospheric dynamics. Weather forecasting and weather modification. Prerequisites: PHY 121 or consent of instructor.

ESC 321 Geology for Engineers (4) FWSp

Fundamentals of geology applied to engineering problems. Includes rock types, structure, erosion, sedimentation, seismic explorations, and rock/soil movements. 3 lectures, 1 three-hour laboratory. For civil engineering majors. Prerequisite: CE 135.

ESC 323 Geomorphology (3) W (even years)

Various landforms and interpretation of forces resulting in these landforms. 2 lectures, 1 three-hour laboratory. Prerequisite: ESC 101 or 111.

ESC 325 Optical Mineralogy (4) W

The chemistry (primarily phase relationships) of the common rock-forming minerals. The description, composition, texture and origin of the common rock-forming minerals according to their optical properties as determined with the petrographic microscope. Two lectures, 2 three-hour labs. Prerequisite: ESC 215, CHM 112 concurrently.

ESC 331 Invertebrate Paleontology (4) Sp

Morphology and evolution of fossil invertebrates. Includes discussions of ancient environments and changes in life forms with time. 3 lectures, 1 three-hour laboratory. Prerequisite: ESC 112, ZOO 137.

ESC 332 Stratigraphy (4) F (even years)

Stratigraphic procedures; correlation, depositional environments, classification and origin of stratigraphic units. 3 lectures, 1 three-hour laboratory. Prerequisites: ESC 111, 112, with lab.

ESC 333 Structural Geology (4) F (odd years)

Structural features and deformation of the earth's crust. Solution of geologic field problems. 3 lectures, 1 three-hour laboratory. Prerequisites: Trigonometry, ESG 125, ESC 111, with lab.

ESC 334 Exploration Geophysics (4) W (odd years)

Geophysical techniques. Gravity, magnetic, electrical and seismic methods applied to the solution of geologic problems. 3 lectures, 1 three-hour laboratory. Prerequisites: ESC 111, with lab, PHY 132 or 122.

ESC 335 Physical Oceanography (3) F

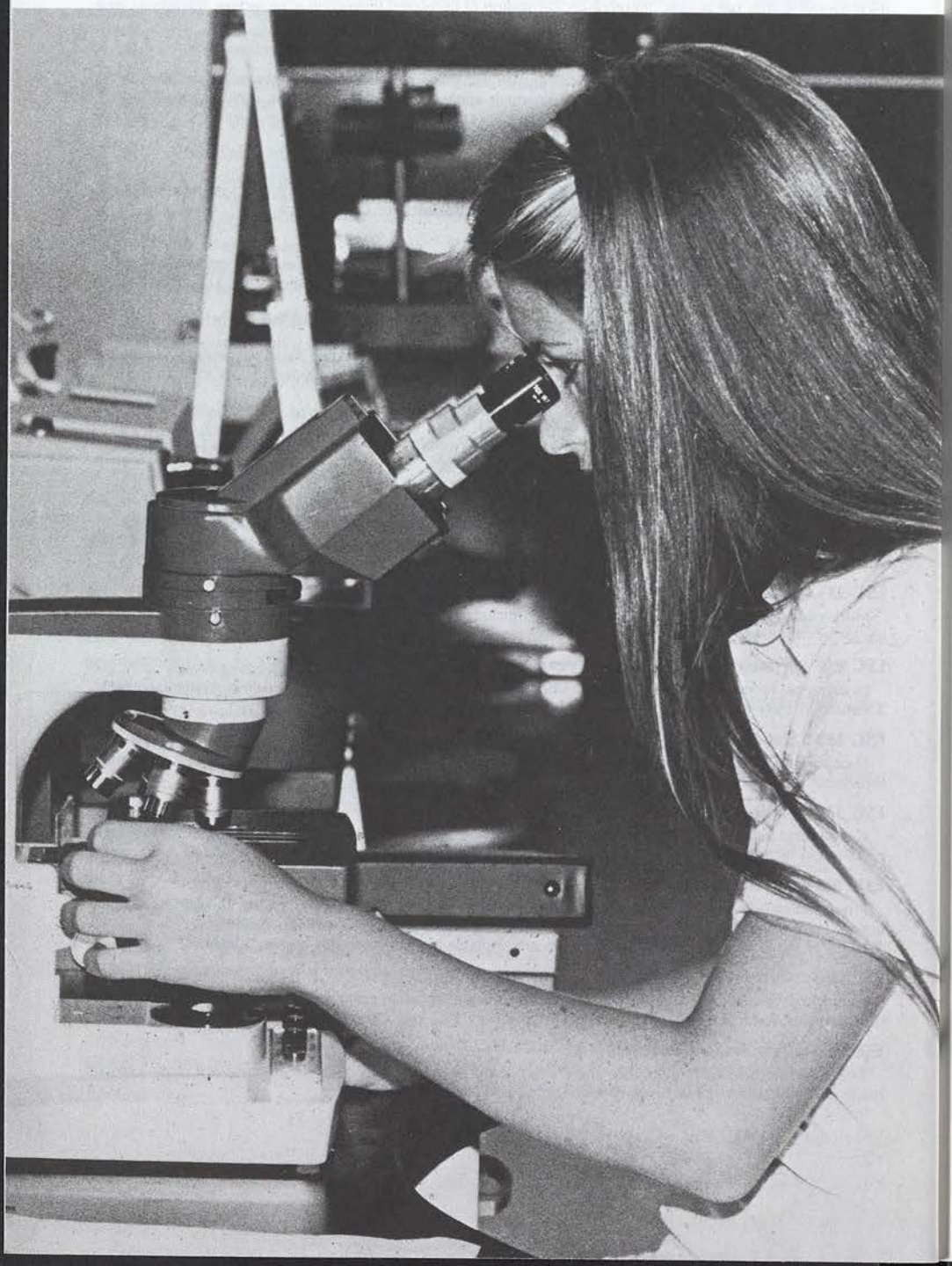
Physical dimensions, geologic structure of the ocean floor, properties of sea water. Ocean currents, tides, wave action. Influence of the sea on weather. Resources, pollution and influence on life. The laboratory and search facilities of the CSU Ocean Studies Consortium are available to students in this course. 3 lectures.

ESC 338 Coastal Processes (3) Sp

Geologic development of, and the hydrologic and geologic processes acting within beach, deltaic and estuarine environments. Field trip required. 3 lectures. Prerequisites: ESC 111, 120 or 335.

ESC 351 Petroleum Geology (3) W

Origin and occurrence of petroleum and related products. Study of the geologic structure and stratigraphy of major oil and gas fields. 3 lectures. Prerequisite: ESC 111 or ESC 112.



ESC 360 Groundwater Geology (4) Sp (odd years)

Groundwater occurrence and movement. Prospecting for and exploitation of groundwater reservoirs, well design and evaluation, application of hydrogeology to geothermal power generation problems and subsurface waste disposal. 3 lectures, 1 three-hour laboratory, field trips. Prerequisites: ESC 111, with lab, one course in college math and physics.

ESC 400 Special Problems for Upper Division Students (1–2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ESC 415 Engineering Geology (4) W

Geologic site investigations; field mapping; subsurface investigations. Geologic analysis of slope stability; subsidence; geology of dam and tunnel construction; ground water geology; seismicity and active fault tectonics; urban geology and engineering geologic reports. Prerequisites: ESC 111, with lab, or ESC 321.

ESC 423 Sedimentary Petrology (4) W (even years)

Descriptive chemical, mineralogic and textural studies of sedimentary rocks, using primarily petrographic, sieve and sedimentation techniques. Theory of the classification and origin of these rocks. Field trips. 2 lectures, 2 three-hour laboratories. Prerequisite: ESC 325.

ESC 424 Igneous and Metamorphic Petrology (3) Spring (Odd years)

Theory of the origin, classification, chemistry and mineralogy of igneous and metamorphic rocks. 3 lectures. Prerequisite ESC 325. Corequisite ESC 425.

ESC 425 Igneous and Metamorphic Petrography (2) Spring (Odd years)

Mineralogy, texture and description of igneous and metamorphic rocks with the petrographic microscope, mineral separation techniques and x-ray diffraction. Field trips. Prerequisite ESC 325. Corequisite ESC 424. 2 three-hour labs.

ESC 433 Economic Geology (4) W

Geochemistry and economic aspects of ore deposits, occurrence and distribution of metallic and nonmetallic ores. Laboratory examination of ore suites and common ore minerals. Field trips to selected mineral locations required. 3 lectures, 1 three-hour laboratory. Prerequisite: ESC 215.

ESC 455 Field Methods (4) Sp (even years)

Techniques of recognizing, plotting, collecting and interpreting geologic structures and earth features. Surveying with plane table, alidade, Brunton compass and tape. 1 lecture, 3 three-hour laboratories. Prerequisite: Consent of instructor and upper division status.

ESC 461, 462 Senior Project (2) (2) FWSpSu

Selection and completion of a project under faculty supervision. Independent study and introduction to research. A formal report is required. Minimum of 120 hours total time.

ESC 463 Undergraduate Seminar (2) Sp

A study of current developments in earth science and a discussion of periodical literature at an appropriate level.

ESC 490 Summer Field Geology (8) Su (even years)

A six-week course in geological field methods. Preparation of geological maps of metamorphic, igneous and sedimentary rock areas. Geologic report on areas mapped. Prerequisite: ESC 455.

ESC 499 Special Topics for Upper Division Students (1–4) FWSpSu

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory or a combination of both.

ESC 520 Exploration and Mining Geology (3) Sp (even years)

Geological applications in mineral discovery and production. Metallogenic provinces, mineral deposits in the subsurface, elements of geotechnics, mineral economics, ore grade, geologic mapping of ore deposits, exploration geochemistry and geobotany, sampling orebodies and reserves estimates, examination and evaluation of mineral deposits and mine mining geology. 3 lectures. Prerequisites: ESC 333, ESC 424, ESC 433 plus senior or graduate standing.

ESC 544 Geotectonics (3) Winter (Even Years)

Study of the major tectonic elements of the Earth, their geometry, kinematics and dynamics with special emphasis on the Cordillera of Western North America. All of the tectonic features will be analyzed in the context of Plate Tectonics.

MATHEMATICS

V. Merriline Smith, *Chair*
Lydia Gans, *Statistics Coordinator*

Laure I. Abu-Haydar
Charles Amelin
Sidney Birnbaum
Cameron C. Bogue
Demetrios Brizolis
Hasan Celik
Yu Chang
Tsu-yee Chen
Theodore J. Cullen
Hsin Ya Fan
John Fisher
Carlos Ford-Livene
Lydia P. Gans
Frank Glaser
Emil R. Herzog
Jack E. Hofer
Donald Hook
David A. Horwitz
Larry D. Irwin
Joseph Kachun
Alice M. King
Thomas M. King
Kenneth B. Kriege
Kei A. Lee
Daniel A. Marcus
Judy McKinney
John C. Morgan, II
James McKinney
Henryka Maslowski-Maya
Frank P. Mathus
William McIntosh
Alan Radnitz
Kamta Rai
Richard A. Robertson
Carol Smith
Harry A. Wilson

The mathematics department offers a flexible major program which may be adapted to serve a variety of needs and interests. The student may develop elective patterns which will prepare him/her for entry into employment in industry and government.

However, each student is urged to develop an elective pattern which will also be preparatory for graduate study either in mathematics or in some quantitative discipline in the sciences, engineering, economics or business. Courses at the 500-level are available as part of a graduate program.

The mathematics department recommends that each student use several free electives to develop depth in some discipline other than mathematics.

Students who plan to enter a credential program should make their desires known as early as possible in order to make effective use of the special counseling available in this area.

Transfer students should complete as much of the calculus sequence as possible before entering Cal Poly. Chemistry and physics courses to be transferred should be those which require calculus concurrently or as a prerequisite.

A high school student planning a major in mathematics should complete one year of physics, one year of chemistry, and four years of mathematics to include thorough preparation in trigonometry and advanced algebra.

Students majoring in mathematics and who have at least a 3.0 GPA may join the honorary society, Kappa Mu Epsilon. Additional information can be obtained from the Department of Mathematics.

CORE COURSES FOR MAJOR

(Required of all students)

Fundamentals of Computer Science	CS	105	(4)
Fortran	CS	205	(4)
Elements of Statistics	STA	221	(4)
Analytic Geometry and Calculus	MAT	114	(3)
Analytic Geometry and Calculus	MAT	115	(3)
Analytic Geometry and Calculus	MAT	116	(4)
Introduction to Linear Algebra	MAT	208	(4)
Calculus of Several Variables	MAT	214	(4)
Calculus of Several Variables	MAT	215	(4)
Differential Equations	MAT	216	(4)
Basic Set Theory and Logic	MAT	313	(4)
Intermediate Analysis	MAT	314	(4)
Intermediate Analysis	MAT	315	(4)
Modern Algebra	MAT	417	(4)
Math Electives (300–400 level)			(16)

OPTION COURSES FOR MAJOR

(Required for specific option)

PURE MATHEMATICS

Advanced Calculus	MAT	413	(4)
Modern Algebra	MAT	418	(4)
Abstract Linear Algebra	MAT	419	(4)
Differential Geometry	MAT	420	(4)
Complex Variables	MAT	428	(4)
Foundations of Mathematics	MAT	450	(4)

APPLIED MATHEMATICS

Choose 6 of the following courses:

Mathematics of Operations Research	MAT	380	(4)
Mathematics of Operations Research	MAT	381	(4)
Mathematics of Operations Research	MAT	382	(4)
Numerical Analysis	MAT	401	(4)
Numerical Analysis	MAT	402	(4)
Differential Equations	MAT	431	(4)
Differential Equations	MAT	432	(4)
Mathematical Programming	MAT	480	(4)
Mathematical Modeling	MAT	485	(4)

SECONDARY TEACHING

History of Mathematics	MAT	306	(4)
Introduction to Topology	MAT	312	(4)
Introduction to the Theory of Numbers	MAT	325	(4)
Modern Euclidean Geometry	MAT	330	(4)
Foundations of Geometry	MAT	415	(4)
Projective Geometry	MAT	416	(4)

STATISTICS

Applied Probability Theory	STA	330	(4)
Applied Statistics I	STA	331	(4)

Applied Statistics II	STA	332	(4)

Choose 12 units from the following:

Nonparametric Statistics	STA	320	(4)
Stochastic Processes	STA	430	(4)
Design of Experiments	STA	435	(4)
Mathematical Statistics	STA	440	(4)
Mathematical Statistics	STA	441	(4)
Special Topics	STA	499	(1-4)
Computer Simulation	CS	390	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Communication in the English Language			(12)
Life Science	BIO	110	(3)
General Chemistry	CHM	111	(3)
General Chemistry Lab	CHM	151	(1)
General Chemistry	CHM	112	(3)
General Chemistry Lab	CHM	152	(1)
General Physics	PHY	131	(3)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Physics Lab	PHY	151	(1)
General Physics Lab	PHY	152	(1)
General Physics Lab	PHY	153	(1)
Discrete Probability Models	STA	220	(4)
Arts, Literature, Philosophy, and Foreign Languages			(12)
Social Sciences			(12)
Integrated Being			(4)
U.S. History, Constitution, and American Ideals			(8)
Upper Division General Education			(8)
Unrestricted Electives			(21)

MINOR IN MATHEMATICS

Analytic Geometry and Calculus	MAT	114	(3)
Analytic Geometry and Calculus	MAT	115	(3)
Analytic Geometry and Calculus	MAT	116	(4)
Calculus of Several Variables	MAT	214	(4)
Calculus of Several Variables	MAT	215	(4)
Differential Equations	MAT	216	(4)
Introduction to Linear Algebra	MAT	208	(4)

Any four upper division courses (except MAT 318, 400, 461, 462, 463, STA 309). No more than two upper division STA courses can be counted towards the Mathematics Minor (see Statistics Minor).

Minimum number of units required: (42)

It is recommended that the student confer with a minor advisor in the selection of courses. Since a maximum of flexibility is afforded, the student is cautioned to pay very careful attention to the prerequisites for the courses selected.

STATISTICS MINOR

Analytic Geometry and Calculus	MAT	114	(3)
Analytic Geometry and Calculus	MAT	115	(3)
Analytic Geometry and Calculus	MAT	116	(4)
Introduction to Linear Algebra	MAT	208	(4)
Calculus of Several Variables	MAT	214	(4)
Calculus of Several Variables	MAT	215	(4)
Applied Probability Theory	STA	330	(4)
Applied Statistics I	STA	331	(4)
Applied Statistics II	STA	332	(4)

Choose 3 courses from the following:

Nonparametric Statistics	STA	320	(4)
Stochastic Processes	STA	430	(4)
Design of Experiments	STA	435	(4)
Mathematical Statistics	STA	440	(4)
Mathematical Statistics	STA	441	(4)
Special Topics	STA	499	(1-4)

Minimum number of units required: 42

For two or more courses with a common course description, each lower-numbered course must be passed with a C or better (or the student must obtain a written consent of the instructor) as a prerequisite for each higher-numbered course.

Course Descriptions

F, W, Sp, Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified, the course is offered each year during the indicated quarter(s). In order to enroll in any math department courses, students must take the CSU system required Entry Level Mathematics test (ELM) for placement purposes.

MAT 001 Preparatory Mathematics (3) FWSpSu

Rational numbers, signed numbers, exponents, distributive law, factoring, equations of one variable, simultaneous linear equations, applications involving percent, velocity, mixture, business problems, physics problems. 3 lecture discussions. NO CREDIT TOWARDS DEGREE REQUIREMENTS.

MAT 010, 011 Introductory Mathematics (3) (3) FWSp

A remedial algebra course designed to help students recover from math anxiety or a deficient background in mathematics. The complete two quarter sequence will equip the student to pursue other mathematics courses, such as MAT 50 or MAT 51. Enrollment requires approval of the Mathematics Department. 3 lecture-discussions. NO CREDIT TOWARDS DEGREE REQUIREMENTS.

MAT 050 Intermediate Algebra (3) FWSpSu

Polynomials, exponents, radicals, algebraic fractions, linear and quadratic equations, functions and graphs, systems of linear equations, logarithms, applications. 4 lecture-discussions. NO CREDIT TOWARDS DEGREE REQUIREMENTS. Prerequisites: high school algebra and geometry.

MAT 051 Basic Mathematics (3) FWSpSu

Elements of trigonometry, analytic geometry, statistics. Not open to any student with credit for the MAT 114-115 sequence. 3 lecture-discussions. Prerequisite: MAT 050 or MAT 11, or consent of instructor. NO CREDIT TOWARDS DEGREE REQUIREMENTS.

MAT 105 College Algebra (4) FWSpSu

Real numbers, inequalities, absolute value, coordinate systems, functions, progressions, linear and quadratic systems, polynomials and mathematical induction. Not open to any student with credit for MAT 115. 4 lecture-discussion. Prerequisite: MAT 050, or consent of instructor.

MAT 106 Trigonometry (4) FWSpSu

The circular functions, general reduction formulas, inverse functions, graphs, exponential and logarithmic functions, Law of Sines, Law of Cosines, identities and complex numbers. Not open to any student with credit for MAT 115. 4 lecture-discussions. Prerequisite: MAT 050 or MAT 11, or consent of instructor.

MAT 114, 115, 116 Analytic Geometry and Calculus (3) (3) (4) FWSpSu

Introduction to analytic geometry, elementary functions, limits. Theory and technique of differential and integral calculus of one variable. 3 and 4 lecture-discussions. Prerequisites for MAT 114: MAT 105 and 106 or equivalent with a C or better or consent of instructor. Prerequisite for MAT 115: C or better in MAT 114 or consent of instructor. Prerequisite for MAT 116: C or better in MAT 115 or consent of instructor.

MAT 125 Introductory Calculus for Business (4) FWSpSu

Graphing, differentiation, integration of rational and exponential functions, with special emphasis on applications to business. Not open to any student whose major requires the MAT 114 sequence. 4 lecture-discussions. Prerequisite: MAT 50 or 51 with a C or better or equivalent, or consent of instructor.

MAT 130, 131 Technical Calculus (4) (4) FWSpSu

Survey of analytic geometry, calculus of rational, exponential, logarithmic, and trigonometric functions. Basic ordinary and partial differentiation. 4 lecture-discussions. Prerequisite for MAT 130: MAT 106 or consent of instructor. Prerequisite for MAT 131: C or better in MAT 130 or consent of instructor.

MAT 135 Survey of Geometry (4)

The fountainhead of all geometrical investigations, modern elementary geometry, elementary transformations, Euclidean constructions, dissections and paper folding, survey of non-Euclidean and projective geometries, and topology. 4 lectures. Prerequisites: two years of high school mathematics, including algebra and geometry.

MAT 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MAT 205 Basic Concepts of Elementary Mathematics (4) FWSpSu

Development of systems of numeration; evolution of the logical basis of the number systems of arithmetic; elementary concepts in logic and set theory; introduction to number theory. 4 lectures. Prerequisite: High school algebra and geometry, or consent of instructor.

MAT 206, 207 Concepts of Elementary Mathematics (4) (3) FWSp

Rational and real number systems, probability and statistics; informal metric and nonmetric geometry; selected topics from algebra and analysis. 4 and 3 lectures. Prerequisite for MAT 206: C or better in MAT 205 or consent of instructor. Prerequisite for MAT 207: C or better in MAT 206 or consent of instructor.

MAT 208 Introduction to Linear Algebra (4) FWSpSu

Introduction to linear transformations of the plane, vector space of n-tuples, matrix algebra, determinants, systems of linear equations. 4 lectures. Prerequisite: MAT 214, or consent of instructor.

MAT 214, 215 Calculus of Several Variables (4) (4) FWSpSu

Vector analysis applied to three dimensional analytic geometry. Theory and technique of multivariable calculus, power series. 4 lectures. Prerequisite for MAT 214: C or better in MAT 116 or consent of instructor. Prerequisite for MAT 215: C or better in MAT 214 or consent of instructor.

MAT 216 Differential Equations (4) FWSpSu

The theory of ordinary differential equations with emphasis on the linear case. 4 lecture-discussions. Prerequisite: MAT 116, or consent of instructor.

MAT 299 Special Topics for Lower Division Students (1–4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of instructor. Instruction to be lecture, laboratory or a combination of both.

MAT 306 History of Mathematics (4) W

Development of mathematics over four millenia. Recommended for students preparing to teach mathematics. 4 lectures. Prerequisite: MAT 215, or consent of instructor.

MAT 312 Introduction to Topology (4) W, Odd years

Topology of the line and plane, topological spaces, continuity and topoligical equivalence, and topics selected from the following: bases and subbases, metric and normed spaces, countability axioms, separation axioms, compactness, connectedness, product spaces, completeness, and function spaces. 4 lectures. Prerequisite: MAT 116, or consent of instructor.

MAT 313 Basic Set Theory and Logic (4) F

Basic set theory and logic, relations, functions, mathematical induction, elementary cardinal number arthmetic. Emphasis on how to present and understand mathematical proof. 4 lectures. Prerequisite: MAT 116, or consent of instructor.

MAT 314, 315 Intermediate Analysis (4) (4) WSp

Metric spaces and continuity. Analysis of functions of a single variable. Sequences, limits, continuity, differentation, integration, introduction to function spaces. 4 lectures. Prerequisite for MAT 314: MAT 216 and MAT 313 or consent of instructor. Prerequisite for MAT 315: C or better in MAT 314 or consent of instructor.

MAT 316 Differential Equations with Applications (4) FWSpSu

An introduction to ordinary differential equations with emphasis on real-world origins, classical methods of solution, and applications to various engineering disciplines. Emphasis is on the linear use, with a brief introduction to basic linear algebra material, especially as it relates to the eigenvalue approach to linear systems. 4 lectures. Prerequisite: MAT 215 or consent of instructor. Not open to anyone with credit for MAT 216.

MAT 317 Laplace Transforms and Fourier Series (3) FWSpSu

Introduction to Fourier Series and Integrals with applications. Elementary theory of Laplace transformation with applications including the solution of differential equations. 3 lectures. Prerequisite: MAT 216, or consent of instructor.

MAT 318 Mathematical Analysis of Engineering Problems (3) FSp

Introduction to the algebra and calculus of vectors including the divergence and Stokes' theorem. Introduction to analytic functions of a complex variable. Not open to mathematics majors. 3 lectures. Prerequisite: MAT 216, or consent of instructor.

MAT 325 Introduction to the Theory of Numbers (4) Sp

Fundamentals of the system of integers, divisibility, congruences, theorems of Fermat and Wilson, power residues and indices, quadratic reciprocity, factorization techniques, diophantine equations, theorems of Euler, Gauss and Lagrange. Elementary results concerning the distribution of primes. 4 lectures. Prerequisite: Junior standing or consent of instructor.

MAT 330 Modern Euclidean Geometry (4) F

Euclidean geometry using modern techniques of transformations, inversions. Extension of elementary geometry to elegant results on triangles, circles, polygons, famous theorems of geometry, unsolved problems. Introduction to deductive reasoning and techniques of proof. Prerequisite: Consent of instructor.

MAT 380 Mathematics of Operations Research (4) F

Introduction to mathematics of linear programming (LP): algebra and geometry of simplex method, solution of LP problems by Gauss-Jordan elimination method. Solution of special types of LP problems (transportation, transshipment, assignment). Duality theory and sensitivity analysis. Development of revised and dual simplex algorithms. Introduction to parametric and separable convex programming. Applications of LP: computational considerations, case studies. Prerequisites: MAT 208, 215, or consent of instructor.

MAT 381 Mathematics of Operations Research (4) W

Formulation and solution of network problems: maximal flow, minimal spanning tree, shortest route problems; PERT-CPM techniques. Introduction to dynamic and integer programming. Elements of game theory, solution of games by linear programming. Introduction to non-linear programming: Kuhn-Tucker conditions, quadratic and convex programming; SUMP solution procedure. Prerequisite: MAT 380, or consent of instructor.

MAT 382 Mathematics of Operations Research (4) Sp

Introduction to Markov queueing models, including development of relevant probability and statistics; estimation of parameters in queueing decision models. Inventory models and forecasting. Introduction to Markov processes and their application to Markov decision models. Introduction to mathematics of reliability. Decision making with experimentation, Bayes' procedure. Generation of random numbers and simulation models. Prerequisites: MAT 208, MAT 215 and STA 236 or STA 330, or consent of instructor.

MAT 400 Special Problems for Upper Division Students (1-2)

Individual or group investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MAT 401, 402 Numerical Analysis (4) (4) FW

The basic methods of numerical mathematics with special emphasis on error analysis. Topics will include non-linear systems of equations, differentiation and integration techniques, practical solutions of ordinary and partial differential equations, introduction to approximation theory. 4 lectures. Prerequisite for MAT 401: MAT 215 and MAT 216 and a knowledge of FORTRAN, or consent of instructor. Prerequisite for MAT 402: C or better in MAT 401 or consent of instructor.

MAT 403 Numerical Methods in Linear Algebra (4) SP

Treatment of numerical methods for determinants, systems of linear equations, matrix inversion, eigen values and eigen vectors. 4 lectures. Prerequisite: MAT 208, CS 205, or consent of instructor.

MAT 413 Advanced Calculus (4) Sp, even years

Differential and integral calculus of functions and transformations in several real variables. 4 lectures. Prerequisite: MAT 315, or consent of instructor.

MAT 415 Foundations of Geometry (4) W

Axiomatic development of selected topics from euclidean and neutral geometries; introduction to non-euclidean geometry with emphasis on the hyperbolic case. 4 lectures. Prerequisite: MAT 208 and 215, or consent of instructor.

MAT 416 Projective Geometry (4) Sp

Synthetic and analytic treatment of selected topics from projective geometry; classical theorems, conics, polarities; quadratic and bilinear forms. 4 lectures. Prerequisite: MAT 208 and 215, or consent of instructor.

MAT 417, 418 Modern Algebra (4) (4) FW

Introduction to algebraic structures; groups, rings, integral domains, fields; mappings with emphasis on morphisms. 4 lectures. Prerequisite for MAT 417: MAT 208 or consent of instructor. Prerequisite for MAT 418: C or better in MAT 417 or consent of instructor.

MAT 419 Abstract Linear Algebra (4) Sp

Vector spaces and dimension, linear transformations, dual spaces, adjoints of transformations, multilinear forms, eigen vectors, the Cayley-Hamilton theorem, inner product spaces, orthogonality, similarity transformations, the spectral theorem, jordan form. 4 lectures. Prerequisite: MAT 208, or consent of instructor.

MAT 420 Differential Geometry (4) Sp, odd years

The Frenet formulas, covariant derivatives, frame fields, the structure equations, differential forms on a surface, normal curvature, Gaussian curvatures; intrinsic geometry of surfaces in E_3, the Gauss and Bonnet theorem. 4 lectures. Prerequisite: MAT 208 and MAT 216, or consent of instructor.

MAT 428, 429 Functions of a Complex Variable (4) (4) FW

Algebra and geometry of complex numbers; analyticity, mappings of elementary functions; Cauchy integral formula, Taylor and Laurent series, the residue theorem; conformal mapping with applications. 4 lectures. Prerequisites for MAT 428: MAT 314 or consent of instructor. Prerequisite for MAT 429: C or better in MAT 428 or consent of instructor.

MAT 431, 432 Differential Equations (4) (4) W, Sp

Partial differential equations with applications to wave actions, heat transfer and fluid flow. Ordinary differential equations; linear with variable coefficients, linear systems; stability and qualitative behavior of solutions. 4 lectures. Prerequisite: MAT 216 and 208 or consent of instructor.

MAT 444 Vector and Tensor Analysis (4) F

An integrated course in the algebra and calculus of vectors and tensors; topics in differential geometry; applications to mechanics of deformable media, hydrodynamics, general relativity. 4 lectures. Prerequisite: MAT 208 and 216. PHY 321 is recommended, or consent of instructor.

MAT 450 Foundations of Mathematics (4) Sp

Major problems in set theory and logic from both the classifical and intuitionistic viewpoints. Transfinite arithmetic; well-ordering and its equivalent; the continuum hypotheses; recursive functions; metatheory of logic and arithmetic with emphasis on consistency, independence, satisfiability, completeness, and decidability. 4 lectures. Prerequisite: consent of instructor.

MAT 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum of 120 hours total time.

MAT 463 Undergraduate Seminar (2)

Discussions through seminar methods of new developments in the fields of student's particular interests. 2 lecture-discussions. Prerequisite: Senior standing in mathematics.

MAT 480 Mathematical Programming (4) W

Treatment of linear inequalities, duality, general algorithms, application of linear programming. Introduction to discrete and nonlinear programming. 4 lectures. Prerequisite: MAT 208 and CS 205, or consent of instructor.

MAT 485 Mathematical Modeling (4) Sp

Mathematical modeling of biological, environmental, physical and social systems. Discrete and continuous, deterministics and stochastic models will be studied. Prerequisites: MAT 208, MAT 216, and STA 236 or STA 330, CS 205, or consent of instructor.

MAT 499 Special Topics for Upper Division Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

STATISTICS

STA 107 Introduction to Statistics (4) FWSpSu

Collection and summarization of data; measures of central tendency and dispersion, probability, binomial and normal distributions, sampling theory, testing, statistical hypotheses. Not open to Mathematics or Engineering majors. 4 lecture-discussions. Prerequisite: MAT 50 or MAT 11, or equivalent, or consent of instructor.

STA 120 Elementary Statistics with Applications (4) FWSpSu

Collection and summarization of data, measures of central tendency and dispersion, probability, binomial and normal distributions, sampling theory; special emphasis on applications in business. Not open to Mathematics or Engineering majors. 4 lecture-discussions. Prerequisite: MAT 50 or equivalent, or consent of instructor.

STA 220 Discrete Probability Models (4) F

Set-theoretic approach to probability in finite sample spaces. Conditional probability, independence, the binomial distribution. 4 lecture-discussions. Prerequisite: MAT 105, or consent of instructor.

STA 221 Elements of Statistics (4) W

Descriptive statistics. Ungrouped and grouped data. Statistical distributions. Sampling techniques, confidence limits. Analysis of variance. Regression and correlation. 4 lecture-discussions. Prerequisite: STA 220, or consent of instructor.

STA 309 Statistical Methods in Engineering and the Physical Sciences (3) FWSpSu

Use of statistical methods in experimentation, testing, inspection and production. Measurement errors, comparison of two or more variances; correlation; design of engineering experiments. Not open to mathematics or computer science majors. 3 lectures. Prerequisite: MAT 214, or consent of instructor.

STA 315 Probability and Statistics for Engineers (4)

Statistical and probabilistic concepts for the analysis of electrical and electronic systems associated with random phenomena. Application to communication, control, instrumentation and logic systems. 4 lectures. Prerequisite: MAT 216, or consent of instructor.

STA 320 Nonparametric Statistics (4) S

Common nonparametric tests such as permutation tests, sign tests, Wilcoxon test, chi-square test, and rank correlation tests. Null distributions and their approximations. 4 lecture-discussions. Prerequisite: STA 220 or STA 330, or consent of instructor.

STA 330 Applied Probability Theory (4) F

Probability models, random variables, expectation of random variables, binomial, Poisson, uniform, and normal distributions. Emphasis on infinite probability distributions and applications. 4 lecture-discussions. Prerequisite: MAT 215, or consent of instructor.

STA 331 Applied Statistics I (4) W

Estimation and testing hypothesis, including maximum likelihood estimation, point estimation of parameters, confidence intervals, likelihood ratio tests, and inference about parameters of normal distributions. 4 lecture-discussions. Prerequisite: STA 330, or consent of instructor.

STA 332 Applied Statistics II (4) Sp

Linear models, least squares estimation, linear regression, correlation, and analysis of variance. 4 lecture-discussions. Prerequisite: STA 331 and MAT 208, or consent of instructor.

STA 430 Stochastic Processes (4) W

Random walks, counting processes, Poisson processes, and renewal processes with applications. Introduction to renewal theory. 4 lecture-discussions. Prerequisite: STA 330 or STA 440, or consent of instructor.

STA 435 Design of Experiments (4)

Latin-square, split-plot, simple and partially confounded factorial design; incomplete block designs, treatment of missing data, techniques of experimentations. Introduction to development of sampling systems. 4 lecture-discussions. Prerequisite: STA 331 or STA 441.

STA 440 Mathematical Statistics I (4) W

Discrete and continuous probability distributions; moments, moment generating functions, special distributions, distributions of functions of random variables. 4 lecture-discussions. Prerequisite: MAT 215 or consent of instructor.

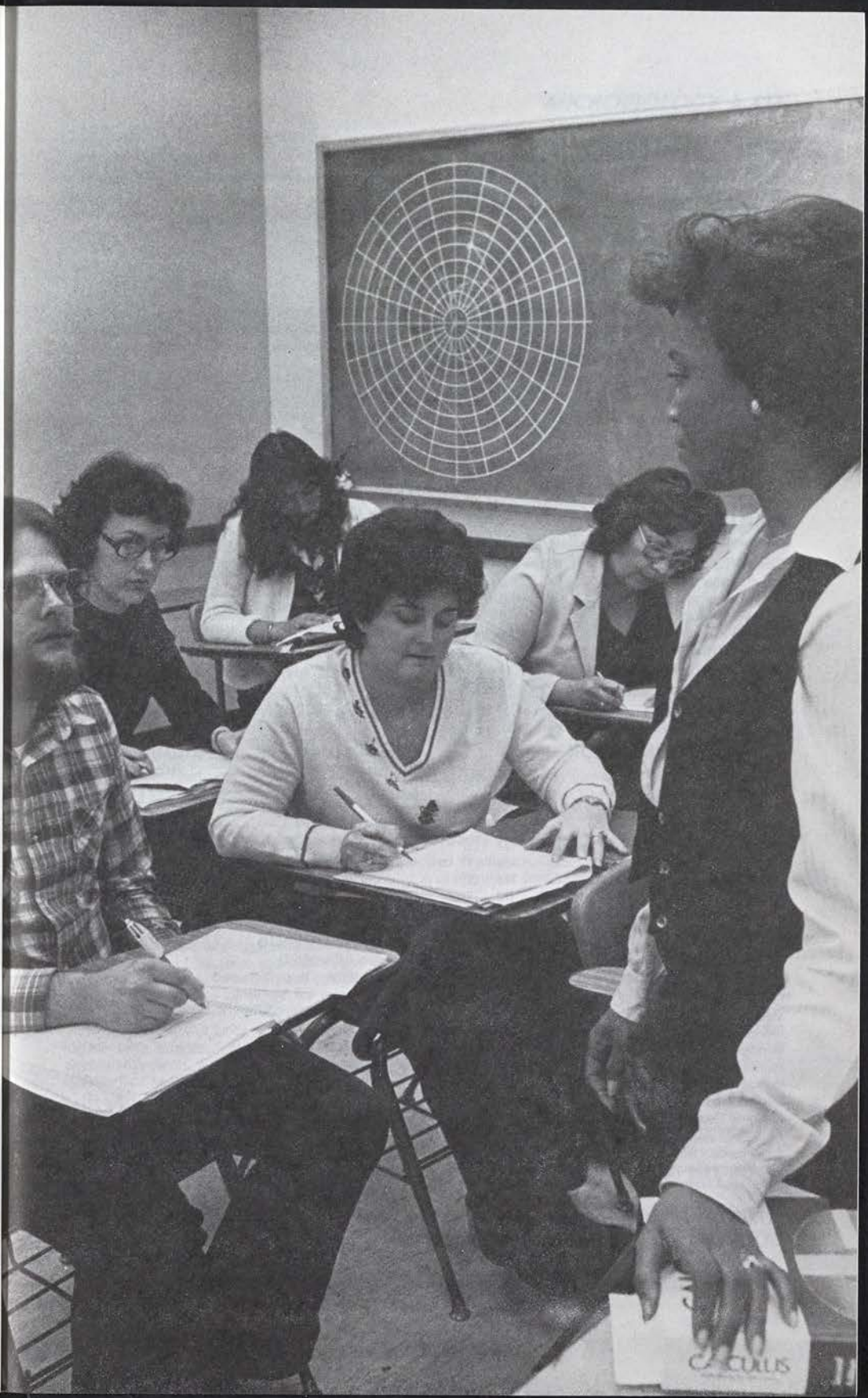
STA 441 Mathematical Statistics II (4) Sp

Asymptotic distributions; central limit theorem; point and interval estimation; completeness and sufficient statistics; Neyman-Pearson theory of testing hypotheses. 4 lecture-discussions. Prerequisite: C or better in STA 440, or consent of instructor.

STA 499 Special Topics for Upper Division Students (1–4) FWSpSu

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

Graduate courses are listed in the graduate section of the catalog.



MICROBIOLOGY

One of the four majors offered in the biological sciences department is microbiology. For other programs in this department see biology, botany, and zoology.

Don C. Force, *Chair*

Bijay K. Pal, *Coordinator*

Jill P. Adler — Brigitte H. Goehler — Larry K. McKane

Robert L. Barlet — James O. Jackson — Fred Shafia

The microbiology major chooses one of the options offered by the section, microbiology or medical technology. The core courses of the major provide a strong background in various areas of biology to better prepare students for their chosen field. The program offered in the microbiology section constitutes excellent undergraduate training and can also be oriented toward the preprofessional fields.

Completion of the medical technology option satisfies the eligibility requirements established by the California State Department of Health and the Registry of Medical Technologists of the American Society of Clinical Pathologists (ASCP) for acceptance into a one year clinical traineeship at an approved School of Medical Technology.

The microbiology section also offers a curriculum leading to the Master of Science in Biology with an emphasis in microbiology.

CORE COURSES FOR MAJOR

(Required of all students)

Genetics	BIO	303	(4)
Senior Seminar	BIO	490	(1,1)
Plant Morphology	BOT	125	(5)
Basic Microbiology	MIC	201	(5)
Microbial Structures and Functions	MIC	300	(5)
Medical Bacteriology	MIC	410	(5)
Immunology-Serology	MIC	415	(5)
General Virology	MIC	430	(5)
Invertebrate Zoology	ZOO	137	(5)
Vertebrate Zoology	ZOO	138	(5)

OPTION COURSES FOR MAJOR

(Required for specific option)

MICROBIOLOGY

Advanced Genetics	BIO	421	(3)
Cellular Physiology	BIO	435	(4)
Plant Structures and Functions	BOT	124	(5)
Applied Microbiology	MIC	310	(5)
Upper division courses in the biological sciences to be chosen in consultation with advisor			(16)

MEDICAL TECHNOLOGY

Clinical Chemistry	CHM	331	(4)
Medical Mycology	MIC	425	(5)
Hematology	MIC	444	(4)
Immunohematology	MIC	445	(4)
Human Anatomy	ZOO	234	(4)
Human Physiology	ZOO	235	(4)
Medical Parasitology	ZOO	425	(5)
Approved Electives *			(3)

* Approved electives include all 300 and 400-level courses in the biological sciences not specifically designed for non-majors. List of approved courses offered by other departments available in Biological Sciences department office.

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Basic Biology	BIO	115	(5)
College Chemistry	CHM	104	(3)
College Chemistry	CHM	105	(3)
College Chemistry	CHM	106	(3)
College Chemistry Lab	CHM	141	(1)
College Chemistry Lab	CHM	142	(1)
College Chemistry Lab	CHM	143	(1)
Organic Chemistry	CHM	314	(3)
Organic Chemistry	CHM	315	(3)
Organic Chemistry	CHM	316	(3)
Quantitative Analysis	CHM	221	(4)
Organic Chemistry Lab	CHM	317	(1)
Biochemistry	CHM	327	(4)
Biochemistry	CHM	328	(4)
Biochemistry	CHM	329	(4)
College Algebra	MAT	105	(4)
Technical Calculus	MAT	130	(4)
College Physics	PHY	121	(3)
College Physics	PHY	122	(3)
College Physics	PHY	123	(3)
College Physics Lab	PHY	141	(1)
College Physics Lab	PHY	142	(1)
College Physics Lab	PHY	143	(1)

Students considering graduate work or professional schools, see recommended courses for preprofessional preparation.

GENERAL EDUCATION REQUIREMENTS

Category I: (Pattern 2)			
A. Freshman Composition	ENG	104	(4)
B. Advocacy and Argument	SP	204	(4)
C. Freshman Composition	ENG	105	(4)
Category II: (Pattern 1)			
A. College Algebra	MAT	105	(4)
B. College Chemistry	CHM	104	(3)
College Chemistry Laboratory	CHM	141	(1)
C. Basic Biology	BIO	115	(5)
D. College Chemistry	CHM	105	(3)
Category III:' Select one course from each area. Minimum total			(12)
Category IV: Select one course from each area. Minimum total			(12)
Category V: Select one of following: CPU 201, CPU 202 *or* PSY 201			(4)

Category VI:
Select one course from each area. Minimum total ..... (8)

Category VII:
Upper Division—minimum ..... (8)
(An additional 4 unit upper division course must be taken to replace a CAT. III or IV lower division course SEE ADVISOR)

MICROBIOLOGY MINOR

Minimum units—40

Note: This minor may *not* be earned by Microbiology majors. Only open to students who have earned at least a "B" in MIC 201. Student must maintain a 2.5 GPA in minor.

Required Courses (all students)

Basic Biology	BIO	115	(5)
College Chemistry	CHM	104	(3)
College Chemistry	CHM	105	(3)
College Chem Lab	CHM	141	(1)
College Chem Lab	CHM	142	(1)
Elements Org Chem	CHM	201	(3)
Elements of Org Chem Lab	CHM	250	(1)
Elements of Biochemistry	CHM	321	(4)
Basic Microbiology	MIC	201	(5)
Microb Struc & Funct	MIC	300	(5)

At least two courses from the following list of courses:

Applied Microbiology	MIC	310	(5)
(OR) Food Microbiology	MIC	320	(4)
Pathogenic Microbiology	MIC	410	(5)
Immunology-Serology	MIC	415	(5)
Medical Mycology	MIC	425	(5)
General Virology	MIC	430	(5)

Other courses may be substituted for those listed above in consultation with all of the faculty in the microbiology section.

Course Descriptions

F, W, Sp and Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified, the course is offered each year during the indicated quarter(s). Parentheses signify that the course *may* be offered during the quarter(s) they enclose. When appropriate, the names of faculty associated with each course are specified, otherwise, "Staff" is noted.

MIC 100 World of Microbes (3) FWSp(Su)

Microorganisms and man's existence. Elements of microbiology and applications to daily life. For nonbiological science majors. 3 lecture-discussions. *Barlet, Jackson, McKane*

MIC 200 Special Problems for Lower Division Students (1–2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Enrollment requires: 1. Prior arrangement with a faculty member; 2. Completion of a supervisory form available only in the Biological Sciences Department office. Total credit limited to 4 units, with a maximum of 2 units per quarter *Staff*

MIC 201 Basic Microbiology (5) FWSpSu

Morphology, classification, physiology, and cultivation of bacteria; relation of bacteria to health of man, animals, and plants. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 110 or 115; CHM 111, 151 or CHM 104, 141. *Staff*

MIC 299 Special Topics for Lower Division Students (1–4) FWSpSu

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both. *Staff*

MIC 300 Microbial Structures and Functions (5) FWSp

Advanced aspects of general microbiology with emphasis upon structure and function of cell components, nutritional types of bacteria, and growth and enumeration of bacteria. 3 lectures, 2 three-hour laboratories. Prerequisite: MIC 201, CHM 201, and 250 or 211, 212 and 251. *Goehler, McKane, Shafia*

MIC 310 Applied Microbiology (5) Sp

The microbiology of foods, air, water, and sewage, stressing the utilization of microbial activities in manufacturing processes of foods, types and prevention of food spoilage, aims and methods of water treatment and sewage disposal. 3 lectures. 2 three-hour laboratories. Prerequisite: MIC 201, CHM 201, and 250 or 211, 212, and 251. *Goehler*

MIC 320 Food Microbiology (4) F

The microbiology of foods as related to storage, transit, human consumption, and health. For foods and nutrition majors. 2 lectures, 2 three-hour laboratories. Prerequisites: MIC 201, CHM 201 and 250. *Goehler*

MIC 400 Special Problems for Upper Division Students (1–2) FWSpSu (Also BIO, BOT or ZOO 400)

Individual or group investigation, research, studies or surveys of selected problems. Enrollment requires: 1. Prior arrangement with a faculty member; 2. Completion of a supervisory form available only in the Biological Sciences Department office. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff*

MIC 410 Medical Bacteriology (5) FSp

Characteristics of disease-producing bacteria, their means of transmission, host-parasite interactions, and laboratory methods of diagnosis. 3 lectures, 2 three-hour laboratories. Prerequisite: MIC 300. *Jackson*

MIC 415 Immunology-Serology (5) FSp

Principles of serology and immunology with emphasis on mechanisms of evaluating resistance to pathogens, and on mechanism of response to antigens on the molecular and cellular level. 3 lectures, 2 three-hour laboratories. Prerequisite: MIC 300. *Adler*

MIC 422 Clinical Laboratory Procedures (4) W

Principles and methods in clinical analysis and evaluation of fluids, cells, tissues, and other body components, waste products, or derivatives. 2 lectures, 2 three-hour laboratories. Prerequisite: CHM 328, ZOO 235. *Barlet*

MIC 425 Medical Mycology (5) W

Characteristics, habitats and laboratory identification of fungi inciting human and animal diseases. 3 lectures, 2 three-hour laboratories. Prerequsite: MIC 201. *Adler*

MIC 430 General Virology (5) WSp

Chemical composition and physical structure of viruses; their mechanism of reproduction; relationship to man, animals, and plants. Introduction to diagnostic techniques used in the isolation and identification of viruses. 3 lectures, 2 three-hour laboratories. Prerequisite: MIC 300. *Pal*

MIC 444 Hematology (4) FSp

Anatomy and physiology of the normal hematopoietic system. Most frequently encountered blood dyscrasias with emphasis on their morphological characteristics as manifested in both bone marrow and peripheral blood. 3 lectures, 1 three-hour laboratory. Prerequisite: ZOO 138 or permission of instructor. *Barlet*

MIC 445 Immunohematology (4) WSp

Immunologic chartacteristics of human red blood cells; immunologic basis for isosensitization, general characteristics of blood group antibodies, plant hemagglutinin and inheritance of blood agglutinogens. 3 lectures, 1 three-hour laboratory. Prerequisite: MIC 415 or permission of instructor. *Barlet*

MIC 499 Special Topics for Upper Division Students (1–4) FWSpSu

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both. *Staff*

PHYSICS

Harvey S. Leff, *Chair*

Keith H. Brown
Robert G. Buschauer
Robert T. Bush
Robert D. Eagleton
John Fang
Edward M. Kelly
James D. Kerwin
John Macropal
Roger L. Morehouse
Barton Palatnick
Vincent Parker
Johannes Tuul

The major in physics prepares students for careers as physicists with industry, government, in university laboratories and in teaching. The program also qualifies as a subject matter major for the standard teaching credential-secondary specialization through fifth year courses offered in physics for the credential program. By suitably chosen electives, students may emphasize the interdisciplinary areas of biophysics or geophysics.

Students majoring in Physics have the opportunity to join the honorary society, Sigma Pi Sigma. Additional information concerning membership can be obtained from the Department of Physics.

CORE COURSES FOR MAJOR

(Required of all students)

General Physics	PHY	131	(3)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Physics	PHY	151	(1)
General Physics	PHY	152	(1)
General Physics	PHY	153	(1)
Elem Modern Physics	PHY	235	(3)
Elem Modern Physics Lab	PHY	253	(1)
Elec Scientists	PHY	240	(4)
or Math Meth Phy	PHY	412	(4)
or Math Meth Phy	PHY	413	(4)
Geometrical Optics	PHY	302	(4)
or Physical Optics	PHY	417	(4)
Physics of Elec & Mag	PHY	313	(3)
Physics of Elec & Mag	PHY	314	(3)
Physics of Elec & Mag	PHY	315	(3)
Mechanics	PHY	321	(4)
Mechanics	PHY	322	(4)
Thermal Physics	PHY	333	(4)
Modern Physics	PHY	401	(4)
Quantum Mechanics	PHY	402	(4)
Quantum Mechanics	PHY	403	(4)
Spec Prob in Exp Phy	PHY	430	(1)
Spec Prob in Exp Phy	PHY	431	(1)
Spec Prob in Exp Phy	PHY	432	(1)
Senior Project	PHY	461	(2)
Senior Project	PHY	462	(2)
Undergraduate Seminar	PHY	463	(2)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Life Science	BIO	110	(3)
or Basic Biology	BIO	115	(5)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry	CHM	113	(3)
General Chemistry Lab	CHM	151	(1)
General Chemistry Lab	CHM	152	(1)
General Chemistry Lab	CHM	153	(1)
Fund of Computer Sci.	CS	105	(4)
Anal Geom. & Calc	MAT	114	(3)
Anal Geom. & Calc	MAT	115	(3)
Anal Geom. & Calc	MAT	116	(4)
Calc of Sev Variables	MAT	214	(4)
Calc of Sev Variables	MAT	215	(4)
Diff. Equations	MAT	216	(4)
Advanced Electives			(16)

(To be chosen from upper division courses in physics or related fields in consultation with advisor; at least half of these must be in physics.)

Free Electives ..... (17–19)
Gen. Ed. Requirements ..... (56–60)

PHYSICS MINOR

College Physics	PHY	121	(4)
and College Physics	PHY	122	(4)
and College Physics	PHY	123	(4)
or General Physics	PHY	131	(4)
and General Physics	PHY	132	(4)
and General Physics	PHY	133	(4)
and Elem Modern Physics	PHY	235	(3)

A min. of 24 units in physics including the above must be taken of which at least 9 units must be chosen from upper division courses ..... (24)

Course Descriptions

The quarters in which particular courses are offered are indicated by the F, W, Sp, Su notations. If a course is not given each year, then the year in which it will next be offered is also given. Where appropriate, the professors associated with a course are listed, with the professor most likely to teach the course next listed first.

PHY 102 Fundamentals of Physics (4) FWSpSu

Various theories of matter and energy and the principles and laws that describe their behavior and applications. Some special knowledge of modern science that will function in a socially desirable manner in the lives of students. 4 lectures. Prerequisite: A college math course. PHY 102 is not open to students who have credit for PHY 121 or 131. *Parker*

PHY 121 College Physics (3) FWSpSu

A study of vectors, motion, forces, gravity, work and energy, momentum, angular motion, and mechanical properties of matter. 3 lectures. Not for students majoring in physics or engineering. Prerequisite: MAT 102 or MAT 104 or equivalent. Concurrent: PHY 141. *Staff*

PHY 122 College Physics (3) FWSpSu

Heat, wave motion, sound, light and optical devices. 3 lectures. Prerequisite: PHY 121. Concurrent: PHY 142. *Staff*

PHY 123 College Physics (3) FWSpSu

Electricity and magnetism, DC and AC circuits, electronics, atomic and nuclear physics. 3 lectures. Prerequisite: PHY 122. Concurrent: PHY 143. *Staff*

PHY 131 General Physics (3) FWSpSu

Fundamental principles of mechanics, vectors, statics, uniform motion, accelerated motion, work and energy, and rotational motion. 3 lectures. Prerequisite: MAT 114; MAT 115 and PHY 151 must be taken concurrently or previously. *Staff*

PHY 132 General Physics (3) FWSpSu

Fundamental principles of harmonic motion, waves, fluid mechanics, thermodynamics, kinetic theory, and geometrical optics. 3 lectures. Prerequisite: PHY 131; MAT 116 and PHY 152 must be taken concurrently or previously. *Staff*

PHY 133 General Physics (3) FWSpSu

Fundamental principles of electricity and magnetism. Coulomb's law, electric fields, potential, properties of dielectrics, capacitance, Ohm's law, magnetism and magnetic fields, measuring instruments, magnetic field of moving charges, induced emf, AC circuits. 3 lectures. Prerequisite: PHY 131; MAT 116; PHY 153 must be taken concurrently or previously. *Staff*

PHY 141, 142, 143 College Physics Lab (1) (1) (1) FWSpSu

Laboratory to accompany College Physics lecture series. Experiments in mechanics, hydrostatics, wave motion, thermodynamics, optics, electricity and magnetism, and atomic and nuclear physics. To be taken in sequence concurrently with PHY 121, 122, 123, respectively. *Staff.*

PHY 151, 152, 153 General Physics Lab (1) (1) (1) FWSpSu

Laboratory to accompany General Physics lecture series. Experiments in mechanics, hydrostatics, wave motion, thermodynamics, optics, and electricity and magnetism. To be taken in sequence concurrently with PHY 131, 132, 133, respectively. *Staff.*

PHY 200 Special Problems for Lower Division Students (1-2) FWSpSu

Individual or group investigation, research, study or survey of selected problems. Approval of problem must be obtained prior to enrollment. Total credit limited to 4 units with a maximum of 2 units per quarter. *Staff.*

PHY 220 Introduction to Acoustics (3) F 1983

Designed primarily for architecture, biology, engineering technology, and geology students. The basics of human speech and hearing, architectural acoustics and noise control, and structural disturbances (including earthquakes) will be presented. 3 lectures. Prerequisites: PHY 122 or 132. *Staff*

PHY 235 Elementary Modern Physics (3) W

Theory of special relativity; origin of the quantum theory; Bohr theory; wave mechanics and atomic structure; introduction to nuclear physics. Physics majors must take concurrently with PHY 253. PHY 253 optional for non-majors. 3 lectures. Prerequisite: PHY 133 or consent of instructor. *Eagleton, Tuul*

PHY 236 Introduction to Nuclear Physics (3) Sp

Elementary theory of nuclear structure, including a study of nuclear reactions, particle accelerators, and nuclear instruments. Application in atomic energy and nuclear engineering. 3 lectures. Prerequisite: PHY 235 or consent of instructor. *Parker*

PHY 240 Electronics for Scientists (4) F

For students majoring in biological sciences, chemistry, earth sciences, and other scientific areas, as well as for physics majors. Basic concepts of electrical circuits, vacuum tubes, and solid state devices. Circuit analysis and operation of instruments commonly encountered in science lab. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 123 or 133 or consent of instructor.

PHY 253 Elementary Modern Physics Laboratory (1) W

Experiments illustrative of modern physics such as the Millikan oil-drop experiment, the Franck-Hertz experiment, Compton scattering, etc. Must be taken concurrently with PHY 235. *Tuul, Eagleton*

PHY 299 Special Topics for Lower Division Students (1-4) FWSpSu

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of instructor. Instruction is by lecture, laboratory, or a combination of both. *Staff*

PHY 302 Geometrical Optics (4) F

Reflection, refraction, mirrors, lenses, and optical instruments. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 122 or PHY 132. *Eagleton, Palatnick*

PHY 306 History of Physics (4) Sp 1983

History of physics from Thales of Miletus to the present with special emphasis on 19th and 20th Century developments. 4 lectures. *Bush*

PHY 313, 314, 315 Physics of Electric and Magnetic Phenomena (3) (3) (3) FWSp

Electrostatics, magnetostatics, circuit theory, time-varying fields, Maxwell's equations, and electromagnetic waves. 3 lectures. Prerequisites: PHY 133 and MAT 215, MAT 216. *Morehouse, Palatnick*

PHY 321, 322 Mechanics (4) (4) FW

Vector algebra, principles of Newtonian mechanics, conservative forces, harmonic motion, central-force motion, the two-body problem, center of mass coordinates, statics and dynamics of rigid bodies, accelerated coordinate systems, normal coordinates, and Lagrange's equations. 4 lectures. Prerequisite: PHY 133 and MAT 216. *Buschauer, Eagleton, Brown*

PHY 333 Thermal Physics (4) W

Fundamental principles of thermodynamics and kinetic theory of gases. 4 lectures. Prerequisite: PHY 122 or 132 and MAT 216. *Kerwin, Brown, Bush, Eagleton*

PHY 336 Introduction to Surface Science (4) W 1984

Elements of vacuum technology; clean and contaminated surfaces; methods of preparing clean surfaces; chemisorption and physiosorption; tools of surface science such as LEED, ESCA, UPS, AES, SIMS; selected applications of surface science. 4 lectures. Prerequisite: PHY 235 or CHM 311 or consent of instructor. *Tuul*

PHY 340 Energy and the Environment (4) SP 1983

Alternative energy technologies with a critical evaluation of their potential for solving the energy crisis and their impact on the environment. Natural resources, energy storage and transport, pollution, radiation hazards, energy conservation efforts, and outlook. 4 lectures. Prerequisite: PHY 122 or PHY 132 or consent of instructor. *Tuul, Kerwin*

PHY 400 Special Problems for Upper Division Students (1–2) FWSpSu

Individual or group investigation, research, study or survey of selected problems. Approval of problem must be obtained prior to enrollment. Total credit limited to 4 units with a maximum of 2 units per quarter. *Staff*

PHY 401 Modern Physics (4) Sp

Theory of special relativity; quantum mechanics; Schrodinger wave equation and its solution; hydrogen atom. 4 lectures. Prerequisites: PHY 235 or CHM 313, and MAT 215, 216. *Bush, Eagleton, Kerwin*

PHY 402, 403 Quantum Mechanics (4) (4) F, W

Schrodinger theory; identical particles; the Pauli exclusion principle; perturbation theory; multielectron atoms and coupling; scattering theory; matrix mechanics; angular momentum. 4 lectures. Prerequisite: PHY 401 or consent of instructor. *Bush*

PHY 404 Advanced Nuclear Physics (4) SP

Nuclear disintegration and nuclear reactions, fusion, fission, nuclear models. elementary particle and high energy physics. 4 lectures. Prerequisite: PHY 401. *Fang, Bush*

PHY 406 Solid State Physics (4) Sp

Crystallography, crystal imperfections, diffusion. Metals, ionic crystals, covalent crystals, molecular crystals. Transport properties and specific heat of metals. Electronic states in solids, physical properties of semiconductors, theory of semiconductor devices. Behavior of dielectrics, magnetism, and superconductors. 4 lectures. Prerequisite: PHY 133 and MAT 215. *Eagleton, Brown*

PHY 407 Statistical Physics (4) Sp 1983

Study of the statistical behavior of physical systems composed of large numbers of similar particles. Derivation and application of the distribution functions for the cases of Maxwell-Boltzmann statistics. Bose-Einstein statistics and Fermi-Dirac statistics. 4 lectures. Prerequisite: PHY 235, 333 and MAT 215. *Bush, Kerwin, Brown*

PHY 410 Biophysics (3) W 1983

Concepts and mechanisms involved in the interpretation of biological systems. A description of living processes in physical terms. (See also BIO 410) 3 lectures. Prerequisite: PHY 123 or consent of instructor. *Giancoli*

PHY 412, 413 Mathematical Methods of Physics (4) (4) F 1982, F 1983

Solutions of problems in physics by mathematical methods such as differential equations, calculus of variations, complex variables. 4 lectures. Prerequisite: MAT 216. *Kerwin, Eagleton*

PHY 417 Physical Optics (4) W

Interference, diffraction, polarization, elements of spectroscopy, lasers, and holography. 3 lectures, 1 three-hour laboratory. Prerequisite: PHY 122 or 132, and MAT 116. *Palatnick, Eagleton*

PHY 420 Acoustics (3) Sp 1983

The fundamentals of acoustical vibrations, baffle effects, resonance and filters, and transmission phenomena will be presented using differential equations and complex variables. 3 lectures. Prerequisites: PHY 132 and MAT 215, 216. *Staff*

PHY 424 Astrophysics (4) F 1983

Elements of spectroscopy, the sun, solar wind, cosmic rays, classification of stars, stellar atmospheres, stellar interiors, novae and supernovae, stellar evolution, neutron and hyperon stars, galaxies, cosmological theories. Prerequisite: PHY 235. *Tuul*

PHY 425 Space Physics (3) W 1984

Topics such as: naturally-occurring plasmas, upper atmosphere phenomena, solar emissions, cosmic rays, planetary investigations, models for planet formation, physics of interplanetary regions, comets. 3 lectures. Prerequisite: PHY 235, 322 (may be taken concurrently) or consent of instructor. *Tuul*

PHY 430, 431, 432 Special Problems in Experimental Physics (1) (1) (1) FWSp

Selected topics in advanced experimental physics. One three-hour laboratory. Prerequisite: consent of the instructor. May be taken in any order. *Buschauer, Morehouse, Eagleton*

PHY 441 Internship in Physics (2) FWSpSu

Practical, on-the-job training and work experience in physics. Endorsement by a physics faculty member (internship coordinator) required. Course grade determined by internship coordinator and on-job supervisor. Total credit limited to 6 units. *Palatnick*

PHY 461, 462 Senior Project (2) (2) FWSpSu

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Project results presented in a formal report. The project must have approval by the advisor prior to enrollment. *Staff*

PHY 463 Undergraduate Seminar (2) Sp

Study of current developments in physics and discussion of periodicals of an appropriate level. 2 lecture-discussions. Required for graduation. *Staff*

PHY 473 Relativity, Gravity, and Black Holes (3) Sp 1984

Review of special relativity, principle of equivalence, tensors, the metric tensor, general theory of relativity, cosmological models, gravitational waves, black holes, Hawking radiation, quantum gravity, connection with elementary particle theories. 3 lectures. Prerequisites: PHY 315, 322, 401, or consent of instructor. *Bush*

PHY 499 Special Topics for Upper Division Students (1–4) FWSpSu

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: consent of instructor. Instruction is by lecture, laboratory, or a combination of both. *Staff*

PHY 550 Seminar in Physics (1-3)

Special problems in selected areas of physics. Seminar, 1 to 3 hours. Maximum of 6 units may be earned.

ZOOLOGY

One of the four majors offered in the biological sciences department is zoology. For other programs in this department see biology, botany, and microbiology.

Don C. Force, *Chair*

Daniel F. Stiffler, *Coordinator*

Jonathan N. Baskin	Bruce L. Firstman	Edward T. Roche
Jack L. Bath	Donald F. Hoyt	David F. Steele
Peter Castro	Edward K. Mercer	Glenn R. Stewart
W. David Edmonds	David J. Moriarty	Laszlo Szijj

Qualified zoology majors are prepared for employment in a variety of state and federal agencies dealing with fish and game, wildlife, management and related areas. An entomology option offered under the zoology major prepares the student for work in many areas of insect control and research.

The curriculum in zoology provides strong premedical, predental, and preveterinary preparation, as well as preparing the student for graduate studies in zoology.

Facilities include a large animal colony, a representative collection of living local reptiles and amphibians and an extensive study collection of bird, mammal, amphibian, reptile and fish specimens. Unique and extensive wild areas are available on the campus for animal studies.

CORE COURSES FOR MAJOR

(Required of all students)

Principles of Evolution	BIO	213	(4)
Genetics	BIO	303	(4)
Principles of Ecology	BIO	325	(4)
Biometrics	BIO	411	(3)
Senior Seminar	BIO	490	(1, 1)
Plant Structures and Functions	BOT	124	(5)
Plant Morphology	BOT	125	(5)
Basic Microbiology	MIC	201	(5)
Invertebrate Zoology	ZOO	137	(5)
Vertebrate Zoology	ZOO	138	(5)
Intro to Entomology	ZOO	226	(4)
Comparative Animal Physiology	ZOO	424	(5)

OPTION COURSES

(Required for specific option)

ENTOMOLOGY

Insect Classification	ZOO	327	(4)
Insect Ecology	ZOO	412	(3)
Structure and Function in Insects	ZOO	423	(5)
Immature Insects	ZOO	434	(3)
Upper division courses in the Biological Sciences to be chosen in consultation with advisor			(8)

ZOOLOGY

Each student will complete at least 5 upper division zoology courses	(23)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

College Chemistry	CHM	106	(3)
College Chemistry Lab	CHM	142	(1)
College Chemistry Lab	CHM	143	(1)
Organic Chemistry	CHM	201	(3)
Organic Chemistry Lab	CHM	250	(1)
Elements of Biochemistry	CHM	321	(4)
Technical Calculus	MAT	130	(4)
College Physics	PHY	121	(3)
College Physics	PHY	122	(3)
College Physics	PHY	123	(3)
College Physics Lab	PHY	141	(1)
College Physics Lab	PHY	142	(1)
College Physics Lab	PHY	143	(1)
Approved Electives			** (12)
Free Electives			(8)

GENERAL EDUCATION REQUIREMENTS

Category I: (Pattern 2)			
A. Freshman Composition	ENG	104	(4)
B. Advocacy and Argument	SP	204	(4)
C. Freshman Composition	ENG	105	(4)
Category II: (Pattern 1)			
A. College Algebra	MAT	105	(4)
B. College Chemistry	CHM	104	(3)
College Chemistry Laboratory	CHM	141	(1)
C. Basic Biology	BIO	115	(5)
D. College Chemistry	CHM	105	(3)
Category III: Select one course from each area. Minimum total			(12)
Category IV: Select one course from each area. Minimum total			(12)
Category V: Select one of following: CPU 201, CPU 202 *or* PSY 201			(4)
Category VI: Select one course from each area. Minimum total			(8)
Category VII: *Upper Division—minimum*			(8)
(An additional 4 unit upper division course must be taken to replace a CAT. III or IV lower division course SEE ADVISOR)			

Students considering graduate work or professional schools, see recommended courses for preprofessional preparation.

** Approved electives include all 200, 300 and 400 level courses taught in the Biological Sciences Department not specifically designed for non-majors. See advisor for approval of courses offered by other departments.

ZOOLOGY MINOR

Minimum units—32
Minimum upper division units—9
Note: This minor may *not* be earned by Zoology majors.

Required Courses (all students):

Basic Biology	BIO	115	(5)
Genetics	BIO	303	(4)
Invertebrate Zoology	ZOO	137	(5)
Vertebrate Zoology	ZOO	138	(5)

Any two from the following courses:

Evolution	BIO	213	(4)
Principles of Ecology	BIO	325	(4)
Animal Physiology	ZOO	424	(5)

At least two courses from the following list of courses to complete the minor:

Introduction to Entomology	ZOO	226	(4)
Human Anatomy	ZOO	234	(4)
Human Physiology	ZOO	235	(4)
Embryology	ZOO	414	(5)
Comparative Anatomy of Vert	ZOO	326	(5)
Insect Classification *	ZOO	327	(4)
Ornithology	ZOO	329	(3)
Comparative Invertebrate Zoology	ZOO	438	(5)
Insect Ecology *	ZOO	412	(3)
Animal Behavior	ZOO	419	(3)
Histology	ZOO	422	(5)
Structure & Function of Insects *	ZOO	423	(5)
Medical Parasitology	ZOO	425	(5)
Herpetology	ZOO	429	(4)
Mammalogy	ZOO	430	(4)
Public Health Entomology	ZOO	435	(4)
Ichthyology	ZOO	441	(4)
Physiological Ecology of Animals	ZOO	440	(4)

* Prerequisite: ZOO 226

ENTOMOLOGY MINOR

Minimum units—32
Minimum upper division units—9
Note: This minor may not be earned by Zoology majors.

Required Courses (all students):

Basic Biology	BIO	115	(5)
Invertebrate Zoology	ZOO	137	(5)
Introduction to Entomology	ZOO	226	(4)
or Intro to Arthropods	AGB	165	(4)
Insect Classification	ZOO	327	(4)
or Field Entomology	AGB	401	(4)

At least two of the following courses must be completed:

Insect Ecology *	ZOO	412	(3)
Structure & Function in Insects	ZOO	423	(5)
Insect Pathology **	ZOO	431	(4)
Immature Insects	ZOO	434	(3)
Public Health Entomology	ZOO	435	(4)

One of the following courses may be used for credit:

Principles of Ecology	BIO	325	(4)
Plant Structures and Functions	BOT	124	(5)
Plant Morphology	BOT	125	(5)
Basic Microbiology	MIC	201	(5)

Remaining units must be from the following courses:

Insect Biology	AGB	228	(4)
Insect Biology	AGB	229	(4)
Principles of Pest Management ****	AGB	231	(3)
Bee Science	AGB	336	(3)
Plant Pathology ***	BOT	323	(4)
Plant Nematology	BOT	423	(3)
Comparative Invertebrate Zoology	ZOO	438	(5)
Medical Parasitology	ZOO	425	(5)

* Prerequisite: BIO 325
** Prerequisite: MIC 201
*** Prerequisite: BOT 124
**** Prerequisite: CHM 103 or equivalent and ZOO 226 or AGB 165

Course Descriptions

F, W, Sp and Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified, the course is offered each year during the indicated quarter(s). Parentheses signify that the course *may* be offered during the quarter(s) they enclose. When appropriate, the names of faculty associated with each course are specified; otherwise, "Staff" is noted.

ZOO 112 The World of Animals (4) Sp

Characteristics, reproduction, behavior, ecology, and interactions with mankind of the major groups of invertebrate and vertebrate animals. 3 lectures, 1 activity. *Staff.*

ZOO 137 Invertebrate Zoology (5) FWSpSu

Evolution and general biology of major phyla of invertebrate animals, Protozoa to Chordata; introduction to the structure and function of invertebrate organ systems. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Mercer*

ZOO 138 Vertebrate Zoology (5) FWSpSu

Evolution and general biology of animals within the phylum Chordata; introduction to the structure and function of vertebrate organ systems, 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Hoyt*

ZOO 200 Special Problems for Lower Division Students (1-2) FWSpSu

Individual or group investigation, research, studies or surveys of selected problems. Enrollment requires: 1. Prior arrangement with a faculty member; 2. Completion of a supervisory form available only in the Biological Sciences Department office. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff*

ZOO 226 Introduction to Entomology (4) FWSp

General aspects of insect structure and function, development, behavior and influence on human activity; includes a survey of the principal insect groups. 3 lectures, 1 three-hour laboratory. Prerequisites: BIO 115, ZOO 137. *Edmonds, Force*

ZOO 234 Human Anatomy (4) FWSp(Su)

Lectures devoted to a description of human gross anatomy. Laboratories emphasize systematic anatomy and use preserved human organs and dissected cadavers on demonstration. 2 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Bath, Steele*

ZOO 235 Human Physiology (4) FWSp

Functions of the major organ systems of the human body with emphasis on the homeostatic mechanisms. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 115. *Steele*

ZOO 299 Special Topics for Lower Division Students (1-4) (FWSpSu)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both. *Staff*

ZOO 326 Comparative Anatomy of Vertebrates (5) FSp

A phylogenetic analysis of the vertebrates based on the structure of organ systems. Includes discussion of the principles of comparative biology, and the significance of comparative morphological data for understanding vertebrate history. 3 lectures. 2 three-hour laboratories. Prerequisite: ZOO 138. *Baskin*

ZOO 327 Insect Classification (4) Sp 1985 (odd years)

Aspects of taxonomic procedure and study of classifications of the Class Insecta. Collection, identification and recognition of significant insect families. 2 lectures. 2 three-hour laboratories. Prerequisite: ZOO 226 or the equivalent. *Edmonds*

ZOO 329 Ornithology (3) F

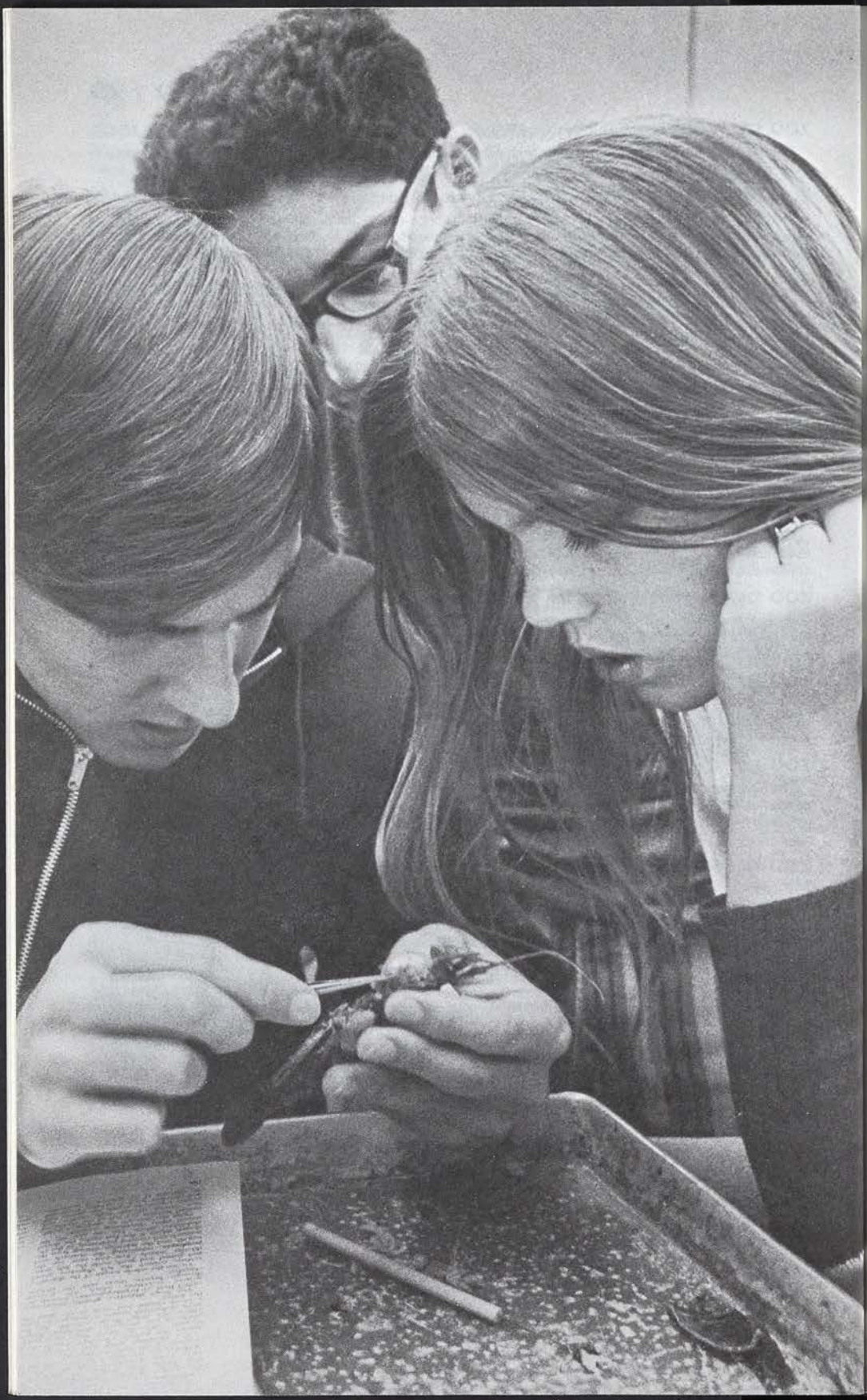
The evolution, anatomy and physiology of birds with special emphasis on behavior and ecological relationships of species of the Pacific Coast Region. 2 lectures, 1 three-hour laboratory, or field exercises, or projects. Two weekend field trips are required for credit in this course. Prerequisite: ZOO 138 or consent of instructor. *Moriarty, Szijj*

ZOO 400 Special Problems for Upper Division Students (1-2) FWSpSu (Also BIO, BOT or MIC 400)

Individual or group investigation, research, studies or surveys of selected problems. Enrollment requires: 1. Prior arrangement with a faculty member; 2. Completion of a supervisory form available only in the Biological Sciences Department office. Total credit limited to 4 units with a maximum of 2 units per quarter. *Staff*

ZOO 411 Biology of Spiders (3) Sp 1985 (odd years)

Recognition of the local spider families, and study of general spider biology, including basic morphology, behavior, ecology, ontogeny, evolution and higher systematics. 1 lecture, 2 laboratories. Prerequisite: ZOO 137 or consent of instructor. *Firstman*



ZOO 412 Insect Ecology (3) F

Principles of ecology as they apply to insects and other invertebrates. 3 lectures. Prerequisites: ZOO 226 or the equivalent, BIO 325. *Force*

ZOO 414 Embryology (5) FWSp

Embryonic development of the vertebrate body. 2 lectures, 3 three-hour laboratories. Prerequisites: ZOO 138. *Firstman, Steele*

ZOO 419 Animal Behavior (3) Sp

Biological, physiological, genetic and anatomical principles of animal behavior. Ethology and experimental psychology involving wild and laboratory animals. 2 lectures, 1 three-hour laboratory. Prerequisite: ZOO 138 or consent of instructor. *Szijj*

ZOO 422 Histology (5) WSp

Microscopic study of vertebrate tissues; organology and correlation of form with function. 2 lectures, 3 three-hour laboratories, taught in the audio-tutorial mode. Prerequisite: ZOO 138. *Roche*

ZOO 423 Structure and Function in Insects (5) W 1984 (even years)

Comparative functional morphology of insects; aspects of insect physiology, 3 lectures, 2 three-hour laboratories. Prerequisites: ZOO 226 or the equivalent, junior standing. *Edmonds*

ZOO 424 Comparative Animal Physiology (5) FW

Introduction to functions of vertebrate and invertebrate organ systems. 3 lectures, 2 three-hour laboratories. Prerequisites: ZOO 137, 138. CHM 106. *Stiffler, Hoyt*

ZOO 425 Medical Parasitology (5) FW

Study of protozoan and helminth parasites of man: diagnosis, life cycles, pathology, epidemiology and control. 3 lectures, 2 three-hour laboratories. Prerequisite: ZOO 137. *Castro*

ZOO 429 Herpetology (4) Sp

Morphology, classification, distribution, ecology, behavior and conservation of amphibians and reptiles; identification, and field study of local species. 2 lectures, 2 three-hour laboratories. Prerequisite: ZOO 138 or equivalent. *Stewart*

ZOO 430 Mammalogy (4) FW

Morphology, classification, distribution, ecology, behavior and conservation of mammals; identification, and field study of local species. 2 lectures, 2 three-hour laboratories. Prerequisite: ZOO 138 or equivalent. *Stewart*

ZOO 431 Insect Pathology (4) W

Study of insect mortality and population size regulation caused by microorganisms, parasitic insects and physiological-genetic factors. 3 lectures, 1 three-hour laboratory. Prerequisites: ZOO 226 or the equivalent, MIC 201. *Force*

ZOO 434 Immature Insects (3) Sp 1984 (even years)

Study of the development, biology and classification of immature insects. 1 lecture, 2 three-hour laboratories. Prerequisites: ZOO 226 or the equivalent. *Edmonds*

ZOO 435 Public Health Entomology (4) W

Role of insects, mites, ticks and other arthropods in the causation and transmission of human disease. 3 lectures, 1 three-hour laboratory. *Force*

ZOO 436 Applied Entomology (4) W

Study of economic problems caused by insects and approaches to their solution. 3 lectures, 1 three-hour laboratory. Prerequisite: ZOO 226 or the equivalent. *Force*

ZOO 438 Comparative Invertebrate Zoology (5) Sp 1984 (even years)

A systematic and comparative survey of all invertebrate groups, including the minor phyla, with emphasis on morphology and phylogeny. 4 lectures, 1 three-hour laboratory. Prerequisite: ZOO 137 *Firstman*

ZOO 440 Physiological Ecology of Animals (4) Sp

Physiological and behavioral adaptations of animals to their environment. Emphasis on problems of energetics, thermoregulation and water balance in terrestrial vertebrates but with some consideration of invertebrates and problems of diving, altitude and environmental time cues. 3 lectures, 1 three-hour laboratory. Prequisite ZOO 424 or consent of instructor. *Hoyt, Stiffler*

ZOO 441 Ichthyology (4) W

The structure, relationships, classification, general biology and zoogeography of fishes. Collection identification and field study of local species, and laboratory work with preserved and living material. 2 lectures and 2 three-hour laboratories. Prerequisite: ZOO 138 and permission of instructor. *Baskin*

ZOO 499 Special Topics for Upper Division Students (1–4) FWSpSu

Group study of a selected topic, the title to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Instruction is by lecture, laboratory, or a combination of both. *Staff*

INSTITUTE FOR ADVANCED SYSTEMS STUDIES

One of the minors offered in the biological sciences department is comparative systems analysis. For other programs in this department, see biology, botany, microbiology, and zoology.

Lenard R. Troncale, *Coordinator*

The institute offers courses leading to a minor in comparative systems analysis. The minor complements a wide variety of major fields from the various schools of the university. Students completing this minor will have developed skills in analyzing complex environmental and other systems problems. Course work in this minor emphasizes the application of transdisciplinary techniques and methodology, and exposes the student to faculty from a broad spectrum of specialties, unified by general systems analytic approaches. The comparative systems analysis minor requires a minimum of approaches. The comparative systems analysis minor requires a minimum of 32 units. Each student will complete the basic course sequence CSA 201-203. Two tracks are available within the minor for students to select according to their background in mathematics. Those students wishing to utilize mathematical models and simulations should select either CSA 305 or CSA 350. Students desiring a relatively non-mathematical approach should take CSA 340. All students will complete the CSA 411-413 sequence.

Students interested in the minor should contact the program coordinator, Dr. Lenard R. Troncale, in the Department of Biological Sciences.

Course Descriptions

CSA 201 Man and Environment—Resources (4)

The dynamic relationships between man and earth's resources: a transdisciplinary approach to theory with problem-oriented activities emphasizing general systems principles. 2 lecture-discussions, 2 two-hour activities.

CSA 202 Man and Environment—Organization (4)

How political, economic and cultural organizations affect man and the environment, particularly in relationship to earth's resources: a transdisciplinary approach to theory with problem-oriented activities emphasizing general systems principles. 2 lecture-discussions, 2 two-hour activities.

CSA 203 Man and Environment—Values (4)

Development of man's value systems in relation to social organizations, technology and the environment: a transdisciplinary approach to theory with problem-oriented activities emphasizing general systems principles. 2 lecture-discussions, 2 two-hour activities.

CSA 305 General Morphology (4)

General principles of morphology and their application to various fields. Dimensionless morphology in mathematics and the natural sciences. Mathematical structures and concepts developed morphologically to illustrate the method. 4 lectures. Prerequisite: approval of instructor.

CSA 340 Systems Law as an Active Force (4)

Law applied to optimizing and correcting systems; survey of legislation and case law dealing with environmental problems. Emphasis on the special difficulties in writing laws of a multidisciplinary nature. 2 lectures, 2 two-hour activities including internship.

CSA 350 Multimetrics (4)

Techniques and methods of measurement systems; comparative uses of metrics; design and application of metrics to human and environmental problems. Emphasis on exploration of the application of metric principles to the evaluation of qualitative differences. 3 lectures, 1 two-hour activity. Prerequisite: Statistics.

CSA 411 General Systems Theory: Hierarchies (4)

Introduction to hypothesis of natural systems evaluation and optimization. Origins of hierarchical structure underlying established sciences on the astronomical, physical, chemical, biological, social and artificial levels. 3 lectures, 1 two-hour activity. Prerequisite: For students selecting mathematical approach BIO 115, for others only BIO 115.

CSA 412 General Systems Theory: Testing Hypotheses (4)

Identification of trends observable in level-to-level evolution of natural hierarchies; emphasizes rigorous testing of the validity of the general systems field axioms abstracted from these trends. 3 lectures, 1 two-hour activity. Prerequisite: CSA 411.

CSA 413 General Systems Theory: Man-Made Systems (4)

Applications of systems field axioms to the study of man-made systems malfunctions. Use of axioms to engineer optimal societal systems. 3 lectures, 1 two-hour activity. Prerequisite: CSA 412.

CSA 450 Introduction to Systems Theory (4)

Evolution of systems approach to problem solving; comparative overview of systems methodology. Case studies illustrating successful versus unsuccessful applications of the systems approach to governmental, biological, social, economic, and technological problems. 4 lectures. Prerequisite: STA 236.

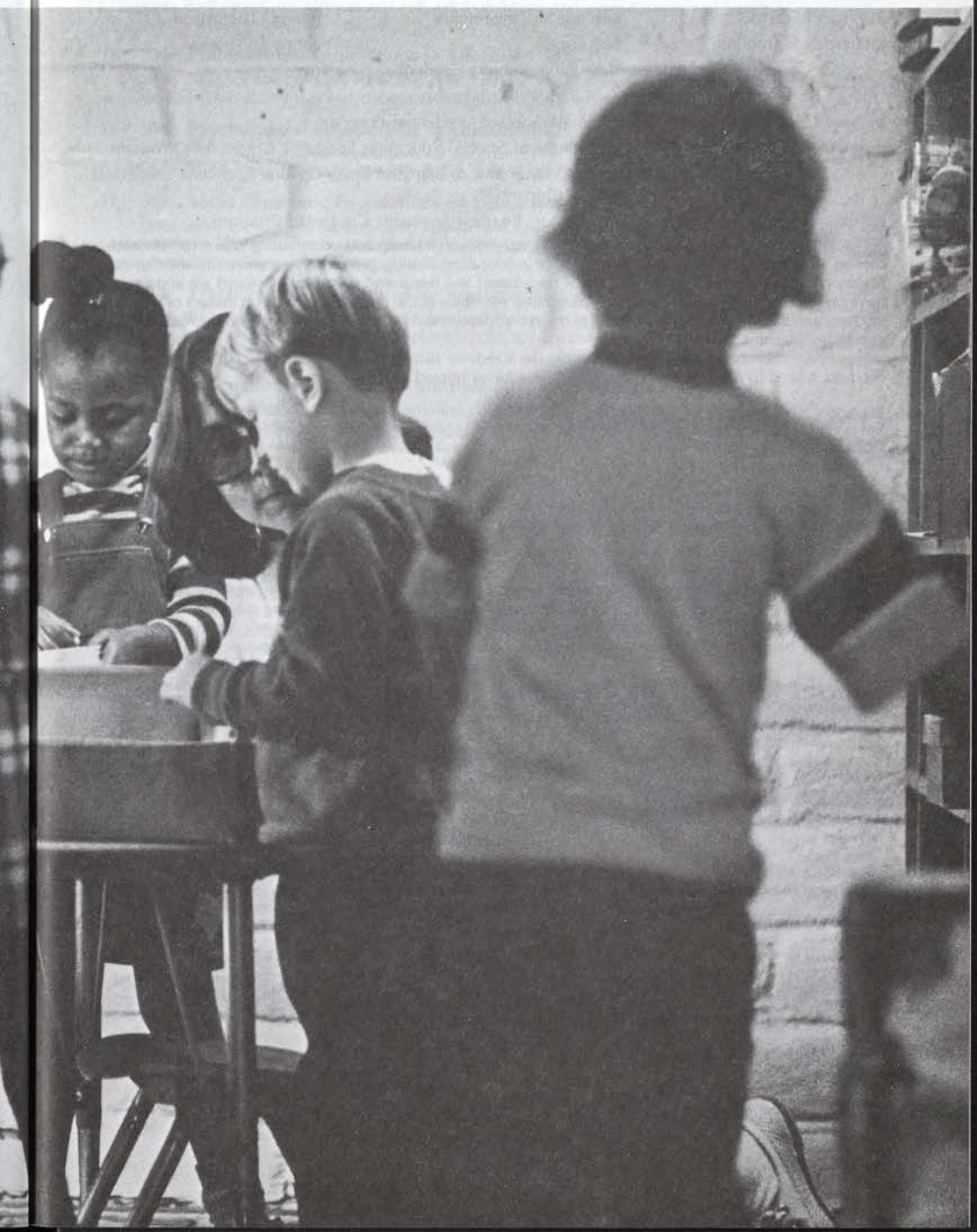
CSA 451 Techniques of Systems Analysis (4)

Modeling of complex systems; analog and digital simulation; critical path methods; optimization methods; case studies illustrating applications of systems analysis techniques and design of new techniques. 3 lectures, 1 three-hour laboratory. Prerequisite: CSA 450.

CSA 490 Seminar in Comparative Systems Analysis (1-4)

Special problems in selected areas of comparative systems analysis. Each seminar will have a subtitle describing its nature and content. Seminar, 1 to 4 hours. May be repeated for a maximum of 8 units. Prerequisite: permission of instructor.

TEACHER PREPARATION CENTER



TEACHER PREPARATION CENTER

David M. Greene, *Director*

Jane S. McGraw, *Associate Director*

Roy Armstrong	Richard C. Jacobs	Ruth Petit
Sarah W. Day	Virginia Johnson	George M. Platner
Gary M. Garfield	Constance Lim	Cecilia Cota-Robles Suarez
Rodman F. Garrity	Barbara H. Lingenfelter	Alvin H. Thompson
Richard L. Hamblin	Leo Lopez	Yvonne L. Turner

Gary M. Garfield—Coordinator of Multiple Subject Credential Program

George M. Platner—Coordinator of Graduate Program

Richard C. Jacobs—Coordinator of Single Subject Credential Program

Rodman F. Garrity—Associate Coordinator of Special Education Specialist Credentials Program

Cecilia Cota-Robles Suarez—Associate Coordinator of Bilingual Cross-Cultural Specialist Credential Program (Chicano)

L. Virginia Johnson—Associate Coordinator, Reading Specialist Credential Program

The Teacher Preparation Center serves as the university's planning and coordinating office for all teacher credential programs and the Master of Arts Degree in Education. Teacher preparation is a university-wide function. Faculty members from each credential major department and designated university personnel are appointed to serve on the Teacher Education Advisory Committee. Members of this committee advise on matters of programs, teacher candidates, and credentials. They also serve as department advisors to credential and degree candidates in program planning.

The Teacher Preparation Center recognizes the needs of handicapped individuals and therefore includes concepts related to special populations in various courses offered by the Center.

Credential Majors Offered

Multiple Subject Credential

Liberal Studies major

Single Subjects Credential

Agriculture, Art, Business, English, Government, History, Home Economics, Life Science, Mathematics, Music, Physical Education, Physical Science, Social Science.

Drama, journalism, and speech majors may qualify for a Single Subject Credential if they meet the requirements set by the English department.

The Teacher Preparation Center offers approved programs leading to credentials in multiple subject, math specialist credential, multiple subject with bilingual emphasis, single subject, the reading specialist, the bilingual/cross-cultural specialist, special education specialist credentials including the learning handicapped credential and the severely handicapped credential, and Clear Resource Specialist Certificate of Competency.

Courses Required for Credential Programs

The courses listed below are required to gain University recommendation for the multiple subject or single subject credential:

	Multiple Subjects	Single Subjects
Teaching Found. TEP 391	3	3
Philosophical Found. TEP 392 or Soc Econ Found. TEP 395	3	3
Psychological Found. TEP 393	3	3
Prac and Proc for MS TEP 405	3	
Instr Analysis for MS TEP 406	3	
Prac and Proc for SS TEP 407		3
Instr Analysis for SS TEP 408		3
Found in Read Instr TEP 411	3	3
Read Instr for Young Readers	3	
TEP 412 or Read and Lang. Instr.—Bilingual TEP 415		
Read Instr for Adoles.		3–4
TEP 413 or Read and Lang. Instr.—Bilingual TEP 415		
TEP 414 Vocational and Skill Reading Instruction		
St. Teach in MS, Block 1, TEP 441	6	
St. Teach in MS, Block 2, TEP 442	12	
Synthesis of MS St. Teach, TEP 443	3	
St. Teach in SS, Block 1, TEP 444		6
St. Teach in SS, Block 2, TEP 445		12
Synthesis of SS St. Teach, TEP 446		3
Exceptional Child/Youth, TEP 454		
	42	42–43

Course Descriptions

TEP 201 Lab and Field Methods for Prospective Teachers (2–3)

Study of materials and methods in laboratory and field work in the schools. Includes studies in methodology and development of curricular approaches for the prospective teacher. 1 lecture 2–3 two-hour activities. May be taken for nine units with no more than three per quarter with director's permission.

TEP 391 Teaching Foundation (3)

Explores institutional, sociological and cultural foundations and current issues and trends of public school education. 2 lectures, 1 two-hour activity.

TEP 392 Philosophical Foundations in Education (3)

Provides in-service and pre-service teachers opportunity to study philosophically grounded issues in contemporary education. Moral and cultural concepts will be examined. 3 lectures.

TEP 393 Psychological Foundations in Education (3)

An overview of psychological implications for education. Human behavior, theoretical bases of thinking and learning, and techniques for assessing performance. 2 lectures, 1 two-hour activity.

TEP 395 Socio-Economic Foundations of Education (3)

An institutional approach to the economic, political and cultural influences on the public schools in the United States with special emphasis on multi-cultural, urban schools and the teacher's ability to cope and progress now and in the future. Alternate to TEP 392. 3 lectures.

TEP 405 Practices and Procedures for Multiple Subjects Classrooms (3)

Activities designed for the identification and development of diverse technical and methodological teaching skills and materials, program development and implementation, state course of study framework, field work. 2 lectures, 1 two hour activity. Must be taken concurrently with TEP 441. Prerequisite: Admission to credential program.

TEP 406 Instructional Analysis for Multiple Subjects Classrooms (3)

Analysis of the instruction, process, evaluation of curriculum structures, and the development of support skills for effective teaching and application of foundations and methods of teaching, field work, 2 lectures. 1 two-hour activity. Must be taken concurrently with TEP 441.

TEP 407 Practices and Procedures for Single Subjects Classrooms (3)

Activities designed for the identification and development of diverse technical and methodological teaching skills and materials, program development and implementation, state course of study framework. 2 lectures, 1 two-hour activity. Prerequisite: Admission to credential program.

TEP 408 Instruction Analysis for Single Subjects Classrooms (3)

Analysis of the instruction process, evaluation of curriculum structures, and the development of support skills for effective teaching, and application of foundations and methods of teaching. Instruction by Single Subjects Department specialist. 3 lectures. Prerequisite: Admission to credential program.

TEP 411 Foundations in Reading Instruction (3)

The reading process, principles, and procedures. Analysis of developmental reading skills with emphasis on phonic and structural analysis. Use and interpretation of an informal reading inventory for diagnostic assessments. 2 lectures, 1 two-hour activity.

TEP 412 Reading Instruction for Young Readers (3)

Analysis of diagnostic and prescriptive techniques for the elementary classroom. Word recognition, reading skills, vocabulary skills, the taxonomy of comprehensive questions and approaches to the teaching of reading including an on-site tutorial program. 2 lectures; 1 two-hour activity. Must be taken concurrently with TEP 441.

TEP 413 Reading Instruction for the Adolescent (3)

Analysis of diagnostic and prescriptive techniques for the secondary classroom as they relate to functional reading in content areas. Word recognition, reading skills, vocabulary skills, the taxonomy of comprehensive questions and approaches to the teaching of reading including an on-site tutorial program. 2 lectures; 1 two-hour activity. Prerequisite: TEP 411.

TEP 414 Vocational and Skill Reading Instruction (4)

Investigation and study of reading instruction techniques for vocational and skill subjects for secondary classrooms. Reading foundations, skill development, instructional approaches and methodology. Study of enrichment activities. Agriculture, home economics and physical education majors only. Offered fall quarter. 3 lectures, and 1 two-hour activity.

TEP 415 Reading and Language Instruction—Bilingual (3)

Principles and practices in the teaching of English as a second language; teaching Spanish to the Spanish-speaking; teaching Spanish to the English-speaking; knowledge of relevant bilingual/cross-cultural reading instruction; understanding of team teaching techniques with paraprofessional; ability to implement performance-based teaching techniques. Prerequisite: two years of college Spanish or equivalent; possession of a teaching credential or admission to a credential program. Alternate to TEP 412. 3 lectures.

TEP 441 Student Teaching in Multiple Subjects, Block 1 (6)

Supervised teaching in University-approved classroom. The teacher candidate will experience initial teaching responsibilities in culturally diverse public school settings. Completion of or concurrent enrollment in TEP 405, 406, 412 and admission to program required. May be repeated on the advice of the coordinator.

TEP 442 Student Teaching in Multiple Subjects, Block 2 (6–12)

Supervised teaching in University-approved schools. Concurrent enrollment in TEP 443. Prerequisite: Admission to student teaching.

TEP 443 Synthesis of Multiple Subjects Student Teaching (3)

A synthesis of knowledge and experiences provided in the multiple subjects program: organization, management, methodology, materials, and the professional rights and relations of teachers. Includes preparation for employment. 3 lectures. Concurrent enrollment in TEP 442.

TEP 444 Student Teaching in Single Subjects, Block 1 (6)

Supervised teaching in University-approved classroom. The teacher candidate will experience initial teaching responsibilities in culturally diverse public school settings. Prerequisite: Completion of or concurrent enrollment in TEP 407, 408, 413 and admission to program required. May be repeated on the advice of the coordinator.

TEP 445 Student Teaching in Single Subjects, Block 2 (6–12)

Supervised teaching in University-approved schools. Concurrent enrollment in TEP 446. Prerequisite: Admission to student teaching. May be repeated on the advice of the coordinator.

TEP 446 Synthesis of Single Subjects Student Teaching (3)

A synthesis of knowledge and experiences provided in the single subjects program: organization, management, methodology, materials, and the professional rights and relations of teachers. Includes preparation for employment. 3 lectures. Concurrent enrollment in TEP 445.

TEP 450 Topics in Education (3)

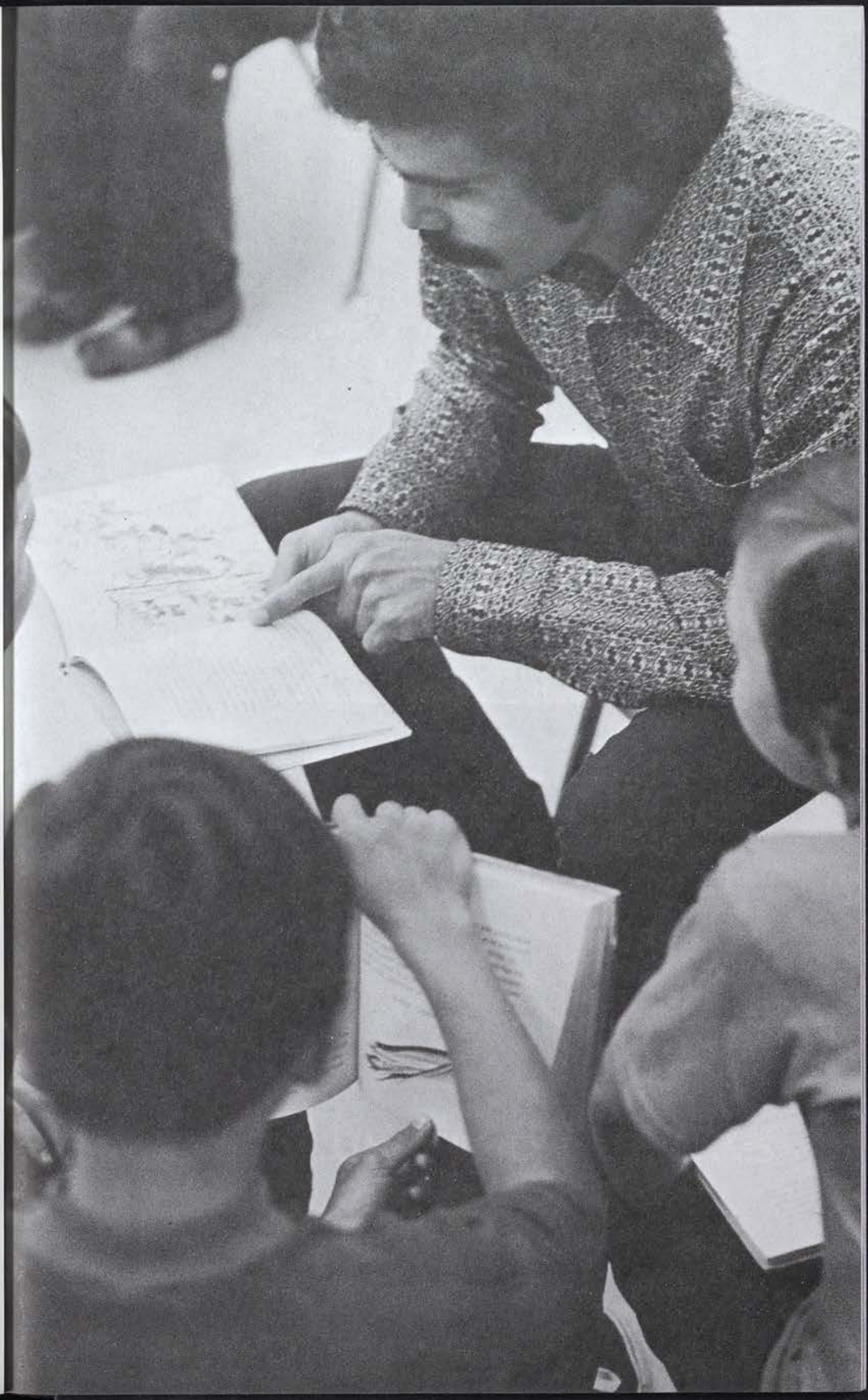
Emphasis on discussion and analysis of selected topics in education. 3 lectures. Prerequisite: consent of instructor. May be repeated for a maximum of 6 units.

TEP 451 Education of the Minority (3)

Foundation study of the ethnic minority cultures as they relate to the teaching-learning process. Research, principles, and practices. Refer to Teacher Preparation Center class schedule for specific group emphasis each quarter. May be repeated for a total of 6 units. 3 lectures.

TEP 454 Exceptional Children and Youth (3)

An introduction to the understanding of children and youth classed as exceptional for educational purposes. 3 lectures.



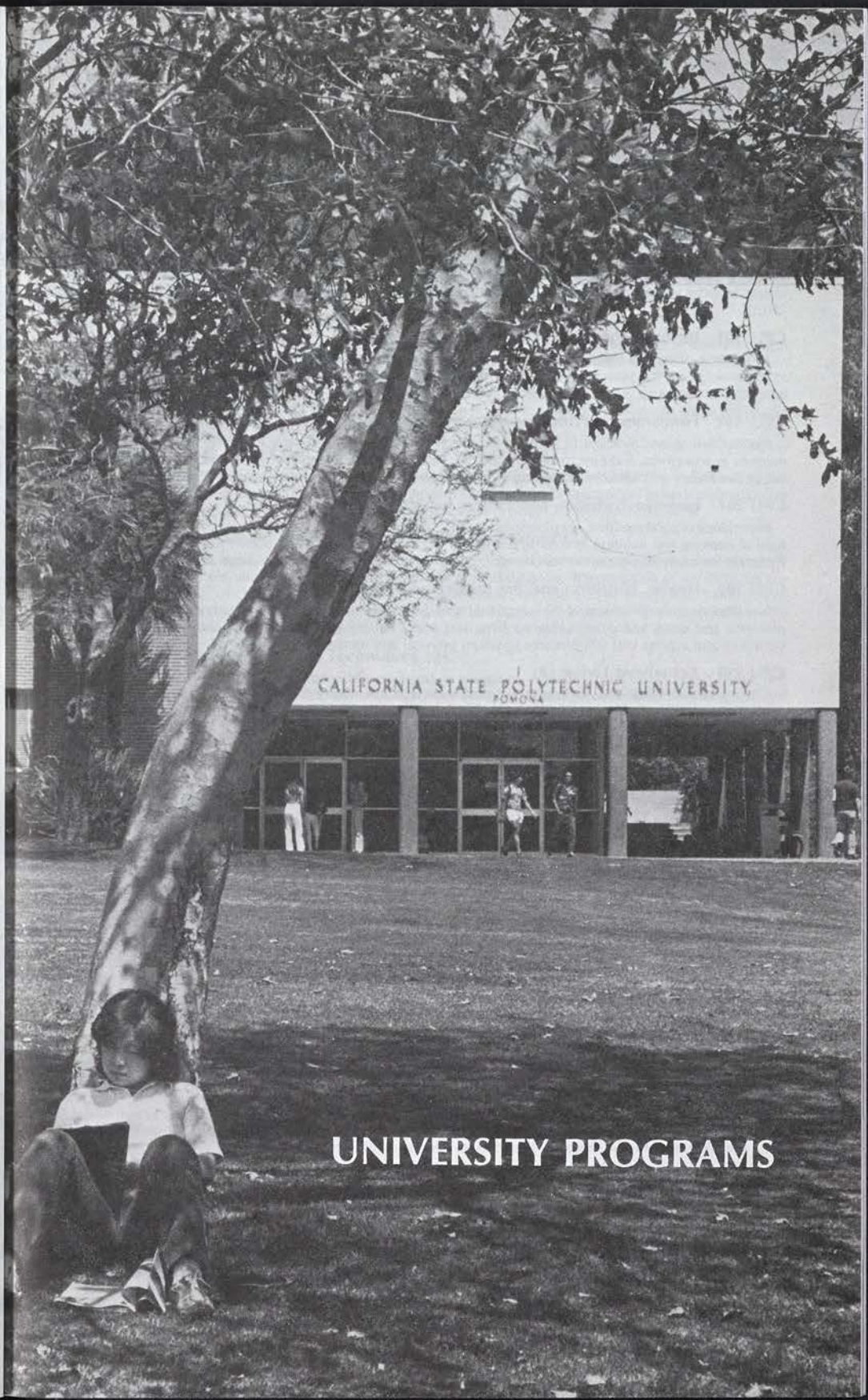
TEP 456 Child and Adolescent Development (3)

Overview of the child and adolescent development process, 0–21 years of age and its relationship to the learning process. 3 lectures.

TEP 460 Practicum: Special Education (3–6)

Supervised practice in assessment, instruction and program evaluation for exceptional children with various learning modalities and developmental levels. On-site experience with a variety of exceptional children and youth. Lecture-discussion 1 hour, activity 4 hours.

Graduate courses are listed in the graduate section of the catalog.



UNIVERSITY PROGRAMS

UNIVERSITY PROGRAMS

Cal Poly University

CPU 100 Career and Personal Exploration (3)

Systematic development of information about (1) self including values, interests, and skills, (2) environment including career clusters, fields and occupational information, (3) decision making and (4) career search techniques. Includes vocational testing and use of the computer-based System of Interactive Guidance and Information (SIGI).

CPU 101 Introduction to the University (1)

This course offers first-time freshmen students an orientation to the university. The class concerns instruction in the structure of the university, scheduling classes, career planning and choice of major, use of the library, co-curricular programs, use of the advisory process, study skills, etc.

CPU 102 Fundamental Principles of Learning Skills (3)

Introduction to and practice in college study techniques and learning skills including: listening, notetaking, memory improvement, and time management. Topics discussed among others: class scheduling, career planning, use of the library and advisory centers, and co-curricular programs. 3 lecture-discussions.

CPU 201 Exercise, Nutrition and Fitness for Modern Society (4)

Importance of good nutrition, circulorespiratory and muscular endurance, strength and flexibility for adult health. Role of exercise and nutrition in control/prevention of cardiovascular disease, obesity and stress-related illness. Rationale for and participation in various adult fitness activities. 3 lectures, 2 one-hour activities.

CPU 202 Health, Nutrition and the Integrated Being (4)

Investigation of specific areas of the integrated being dealing with nutrition, stress, drugs, sexuality, major health problems and death and dying. Understanding their effect on "the integrated being" and the development of behaviors and actions that will promote optimum physical and mental health. 4 hours, lecture.

CPU 210 Actualized Living (4)

Lifelong physiological and socio-psychological aspects of the leisure phenomenon. Experience in assessing student's leisure knowledge and habits coupled with a comprehensive leisure counseling follow through. Includes a one unit component in death and dying. 2 lectures, 1 lecture-discussion, 1 two-hour activity.

International Programs

IPC 199 Foreign Study Topics: (Course Title) (1–6)

Study undertaken in a foreign university under the auspices of the California State Colleges International Programs.

IPC 399 Foreign Study Topics: (Course Title) (1–6)

Study undertaken in a foreign university under the auspices of the California State Colleges International Programs.

IPC 599 Foreign Study Topics: (Course Title) (1–6)

Graduate study undertaken in a foreign university under auspices of the California State University and Colleges International Programs. Maximum credit 9 units.

Library

LIB 103 Library and Bibliographical Techniques (3)

Fundamentals of finding information in the library and obtaining information from government and commercial sources. General and specialized bibliographical citations. 2 lectures, 2 one-hour laboratories.

LIB 399 Advanced Bibliographical Techniques (1–4)

Research and bibliographical techniques for special discipline areas. Each time the course is offered it will focus on a specific area. May be repeated. Prerequisite: permission of instructor.

Military Science

MS 101 History of the World Wars (3)

A survey course in the military history of early 20th Century warfare. Managerial revolution in warfare at the turn of the centruy, origins and causes of World War I, tactical and strategic analysis of World War I campaigns, the war at sea, the submarine campaign, impact of technology and evolution of tactics. 3 lecture-discussions.

MS 102 History of the World Wars (3)

A survey course in the military history of early to mid 20th Century warfare. Review of World War I, closing campaigns, impact of new tactics and material, the long armistice 1919–1939, rise of the Third Reich and the Japanese Empire, origins and causes of World War II, opening campaigns through Operation Barbarossa and Pearl Harbor. 3 lecture-discussions.

MS 103 History of the World Wars (3)

A survey course in the military history of mid 20th Century warfare to the present time. Tactical and strategic analysis of World War II (1942-1945), the Battle of the Atlantic, strategic bombing, limited war (Korea), guerilla war (Vietnam), superpower client war (Mideast 1973). 3 lecture-discussions.

MS 201 The Military as a Profession (3)

Analysis of the role of the soldier as it has developed in Western Society within the model of professionalism as characterized by expertise, responsibility and corporateness. 3 lecture-discussions.

MS 202 The Military in Society (3)

Analysis of the means whereby this "largest single institution in American society" influences and is influenced by government, society and its own membership. 3 lecture-discussions.

MS 203 Dynamics of Military Leadership and Management (3)

Psychological theories, models and concepts as applied to the practice of military leadership and management. Focus on the role and style of the officer in applying principles of motivation, organizational behavior, participative management, and psychometrics to solving military management problems. 3 lecture-discussions.

MS 204 Fundamentals of Map Reading and Land Navigation (2)

Lecture and practical applications of skills necessary to read a map and navigate on the ground. Topics include marginal information, elevation and relief, determination of ground distance, determination of locations on the ground using a military or civilian map, compass, protractor, intersection, resection or terrain association; use of the lensatic and silva compass, including azimuth conversion and its use in navigation. The course will enable students to navigate from one point on the ground to another point on unfamiliar terrain. 2 lectures.

MS 205 Basic Outdoor Survival Techniques (2)

The application of survival skills in the outdoors including navigation without a map, health and hygiene, first aid, hazards, food and water, firemaking and cooking, construction of shelters, construction of survival kits, and varying climatic survival situations. 2 lecture-discussions.

MS 206 Basic Rappelling and Military Mountaineering Techniques (2)

The application of skills necessary to rappell down a sheer rock face including knot tying, safety, construction of swiss seat, preparation of site, positions and commands, mountain and desert rescue applications and basic first aid. The course will enable students to learn the basic skills necessary to safely descend sheer rock faces. 2 lecture-discussions.

Air Force ROTC

Courses are offered under an alternating year program. During even numbered years, the 200 and 400 level courses are offered. During odd numbered years, the 100 and 300 level courses are offered.

AF 101 U.S. Air Force Mission and Organization (1)

Evolution of the U.S. military. Discusses issues of human rights and the military, civilian control of Armed Forces in peace and war, investigates the organization and functions of the Air Force. Concurrent enrollment in Leadership Activity (AF 104) is an integral part of AFROTC training and is a required activity. AF 101, 102, and 103 are considered a single block of instruction for those students interested in pursuing an Air Force career. These courses constitute the freshman AFROTC course of instruction. 1 lecture.

AF 102 U.S. Air Force Mission and Organization (1)

Study of the Strategic Air Command (SAC) as a deterrence force, its aircraft, missile systems, and its communications network. Investigation of the Aerospace Defense Command (ADCOM), North American Defense Command (NORAD), their missions and forces assigned; explanation of the role of the Navy in strategic deterrence and the organization of the Army in its traditional ground operations. Concurrent enrollment in Leadership Activity (AF 104) is an integral part of AFROTC training and is a required activity. Lecture. Prerequisite: AF 101 or permission of instructor.

AF 103 U.S. Air Force Mission and Organization (1)

Investigation of the missions, organization and composition of Air Force major commands, (Tactical Air Command, Military Airlift Command, Air Force Systems Command, Air Force Logistics Command, Air Training Command, and Air Force Communications Command), the U.S. Air Force Reserve and National Guard, and the Separate Operating Agencies which provide specialized functions in support of the USAF mission. Concurrent enrollment in Leadership Activity (AF 104) is an integral part of AFROTC training and is a required activity. Lecture. Prerequisite: AF 102 or permission of instructor.

AF 104 Freshman AFROTC Leadership Activity (0)

Military drill and laboratory exercise. Required of all AFROTC students. May be repeated for a maximum of three times. To be taken concurrently with AF 101, AF 102, and AF 103.

AF 201 The History of the U.S. Air Force to 1920 (1)

Review of the evolution of air power as a projection of national interests, as a weapon of warfare, and the development of aerospace power from the Wright Brothers through World War I. Leadership Activity (AF 204) is an integral part of AFROTC training and is a required activity. AF 201, 202, and 203 are considered a single block of instruction for those students interested in pursuing an Air Force career. These courses constitute the Sophomore AFROTC course of instruction. Concurrent enrollment in AF 204 is also required in all AFROTC courses. Lecture. Prerequisite: AF 103 and 104.

AF 202 The History of the Air Force to 1950 (1)

Evolution of air power during the years 1920 through 1950. Emphasis on the struggle to recognize air power's potential as a weapon the use of air power during World War II, and discussion/examination of the National Security Act of 1947 which resulted in the United States Air Force. Concurrent enrollment in Leadership Activity (AF 204) is an integral part of AFROTC training and is a required activity. Lecture. Prerequisite: AF 201 or permission of instructor.

AF 203 The History of the Air Force to 1975 (1)

Evolution of air power during the years 1950 through 1975. Emphasis on international confrontations involving the United States and the role of air power. Korea, Cuba, Vietnam, and the Middle East are discussed. Concurrent enrollment in Leadership Activity (AF 204) is an integral part of AFROTC training and is a required activity. Lecture. Prerequisite: AF 202, or permission of instructor.

AF 204 Sophomore Leadership Activity (0)

Military drills and laboratory exercise. Required of all AFROTC students. May be repeated for a maximum of three times. To be taken concurrently with AF 201, 202, and 203.

AF 301 Air Force Management and Leadership (3)

Role definition, motivation, behavior, and group dynamics for the Air Force manager. Written and oral communication practicum. Concurrent enrollment in Leadership Activity (AF 304) is mandatory each quarter. AF 301, 302, and 303 are considered a single block of instruction for those students interested in pursuing an Air Force career. 3-lecture discussion. Prerequisite: Satisfactory completion of Summer Field Training during sophomore summer or permission of instructor.

AF 302 Air Force Management and Leadership (3)

Leadership research models, leadership styles, approaches to leadership, leadership problems. Oral and written communication practicum. Concurrent enro'lment in Leadership Activity (AF 304) is mandatory each quarter. 3-lecture discussion. Prerequisite: AF 301 or permission of instructor.

AF 303 Air Force Management and Leadership (3)

Decision-making by the Air Force manager, analytical aids, organizational and personal values, management of forces in change. Written and oral communications practicum. Concurrent enrollment in Leadership Activity (AF 304) is mandatory each quarter. 3-lecture discussion. Prerequisite: AF 302 or permission of instructor.

AF 304 Junior Level AFROTC Leadership Activity (0)

Advanced leadership experiences in administering to lower class cadets and preparation for transition from civilian to military life. Required of all AFROTC students. May be repeated for a maximum of three times. To be taken concurrently with AF 301, 302, and 303.

AF 401 National Security Forces in Contemporary American Society (3)

Armed forces as an integral element of society. American civil-military relations. Written and oral communication practicum. Concurrent enrollment in Leadership Activity (AF 404) is mandatory each quarter. AF 401, 402, and 403 are considered a single block of instruction for students interested in pursuing an Air Force career. 3-lecture discussion. Prerequisite: AF 303, 304; Satisfactory completion of Summer Field Training; or permission of instructor.

AF 402 National Security Forces in Contemporary American Society (3)

Factors influencing the formulation and implementation of U.S. defense plans. Political, economic, and social constraints on national defense structure. Written and oral communication practicum. Concurrent enrollment in Leadership Activity (AF 404) is mandatory each quarter. 3-lecture discussion. Prerequisite: AF 401 or permission of instructor.

AF 403 National Security Forces in Contemporary American Society (3)

Impact of technological and international developments on strategic preparedness. National security policy. Requisites for maintaining adequate security forces. Military justice system. Concurrent enrollment in Leadership Activity (AF 404) is mandatory each quarter. 3-lecture discussion. Prerequisite: AF 402 or permission of instructor.

AF 404 Senior Level AFROTC Leadership Activity (0)

Advanced leadership experiences in administering to lower class cadets and preparation for transition from civilian to military life. Required of all AFROTC students. May be repeated for a maximum of three times. To be taken concurrently with AF 401, 402, and 403.

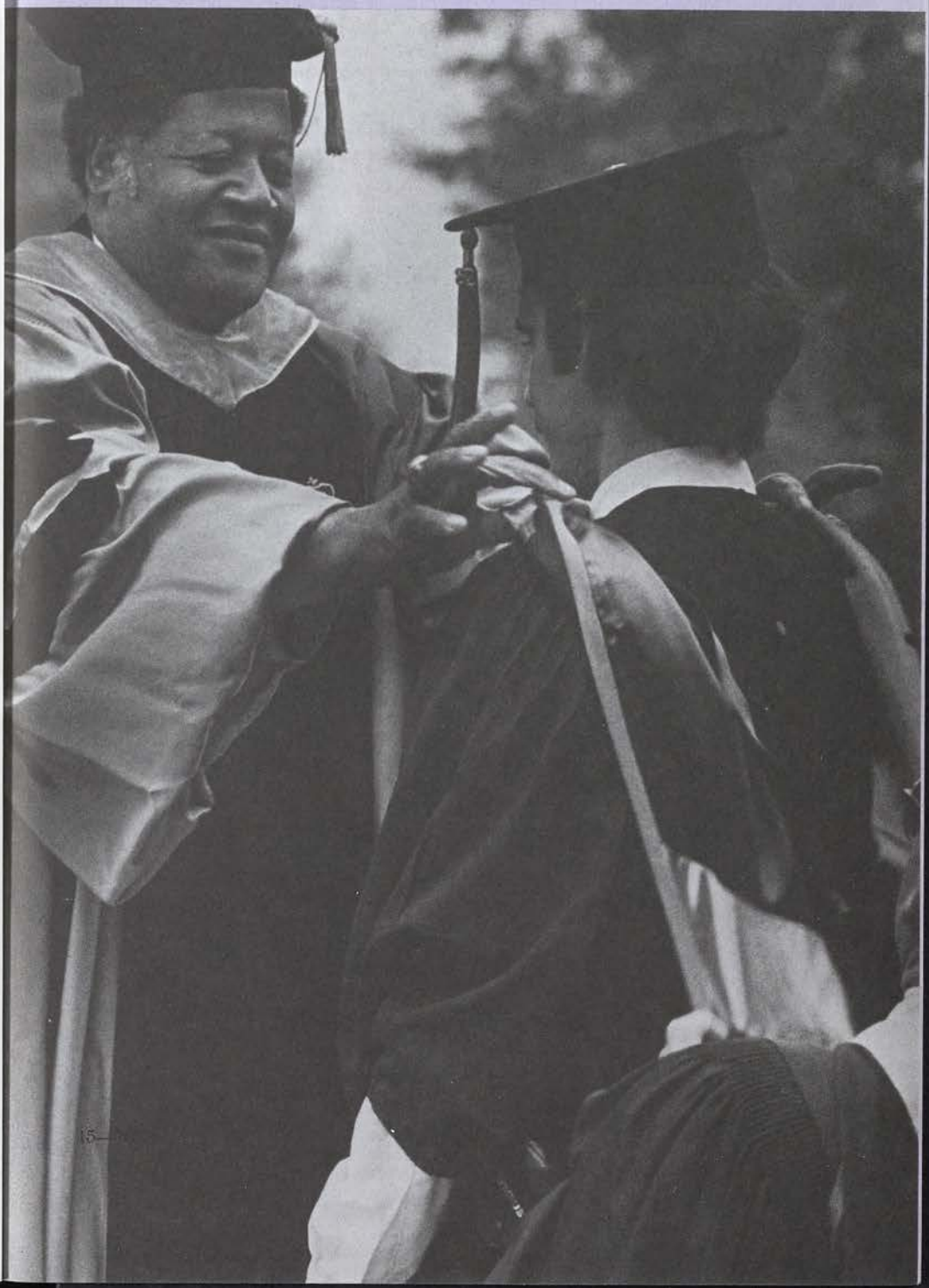
ATHLETIC DEPARTMENT

Karen L. Miller, *Acting Athletic Director*
Darlene May, *Assistant Athletic Director*

Tom Ash
Jim Azelton
Dan A. Carnevale
Jerry Chandler
Blynn T. De Niro
Victor E. Nicoles
Otto Rieger
Dennis A. Rogers
James J. Sackett
John H. Scolinos
Glenn Shenker
Brent A. Shyer
Carol A. Spanks
Barbara Thaller
Shirley Topley
John G. Turek
Ralph J. Venuto
Robert I. Wagner
Chris Ward
Tracy Willis

The Athletic Department offers opportunities for men and women in a wide variety of sports, which include badminton, baseball, basketball, cross country, football, gymnastics, softball, tennis, track and field, and volleyball. In addition to local conferences, the University holds memberships in both the NCAA and the AIAW, which provide for regional and national competition. These opportunities are open to all qualified students. The University has gained recognition from the performances of its many outstanding athletic teams.

GRADUATE STUDIES



GRADUATE STUDIES

This section of the catalog provides information to prospective, continuing graduate, and post-baccalaureate students. Included in this section is information regarding admission criteria, graduate and post-baccalaureate academic requirements, and the programs leading to master's degrees offered by the academic schools and the Teacher Preparation Center. It includes descriptions of all graduate-level courses offered by the university in those departments and schools with master's degree programs.

MASTER'S DEGREES AND CREDENTIALS OFFERED BY THE UNIVERSITY

All graduate study in the university is under the general direction of the Dean of Instruction. The advanced programs are the product of the facilities of the academic schools and the Teacher Preparation Center. The graduate and post-baccalaureate programs offered at the university are as follows:

Master of Science in Agriculture
- **Agricultural Science**
- **Animal Science**
- **Nutrition and Food Management**

Master of Architecture
Master of Science in Biological Sciences
Master of Business Administration
Master of Science in Business Administration
- **Business Education**
- **EDP Auditing**

Master of Science in Chemistry
Master of Science in Computer Science
Master of Science in Economics
Master of Arts in Education
Master of Engineering
Master of Arts in English
Master of Landscape Architecture
Master of Science in Mathematics
Master of Science in Physical Education
Master of Urban Planning
Multiple Subject Teaching Credential
Single Subject Teaching Credential
Agriculture Specialist Credential
Bilingual/Cross Cultural Specialist Credential
Reading Specialist Credential
Special Education Specialist Credential
- **Learning Handicapped**
- **Severely Handicapped**

Resource Specialist Certificate

THE GRADUATE COUNCIL

The Graduate Council consists of a representative of the faculty from each of the academic schools and the Teacher Preparation Center and ex-offico members from appropriate areas of the university. The council is advisory to the graduate dean in matters dealing with curriculum, graduate student affairs, graduate studies policy, and other areas related to the university's graduate and post-baccalaureate programs.

School of Agriculture ..... Melina Burrill
School of Arts ..... Stanley L. Bassin
School of Business Administration ..... Madeline Currie
School of Engineering ..... Seung Li
School of Environmental Design ..... Jeffrey K. Olson
School of Science ..... David J. Moriarty
Teacher Preparation Center ..... George L. Platner
Associated Students ..... Gary Kaplan
Graduate Studies Office ..... Donald S. Castro, ex-officio
Jessie Parker, secretary
University Library ..... Erik Ennerberg

PROCEDURES FOR GRADUATE AND POST-BACCALAUREATE STUDENTS

If you are seeking admission to the university as a graduate or post-baccalaureate student or are presently enrolled in such status you are urged to follow this check list. By following the procedures on this list you may avoid unnecessary difficulties in your progress toward an advanced degree or a teaching credential. You are responsible for complying with procedures, regulations, and deadlines relating to your objective. You should take the initiative to go through the necessary steps. If in doubt, inquire of your departmental or school graduate coordinator, the Teacher Preparation Center, or the Graduate Office. For the details of these procedures consult the university catalog, your departmental graduate adviser, or the Graduate Office. Some programs may have additional steps which are described in the departmental program descriptions in the catalog.

• Action initiated by the student

ADMISSION TO THE UNIVERSITY

• Apply to the Office of Admissions for admission to the university.

• If you are presently enrolled at this university as an undergraduate student, submit an Application for Change to Graduate Status (form GS-17), no later than the final quarter of your senior year. It will be processed in the same manner as an application for admission.

• If you are not presently enrolled at this university, whether or not you have attended before, complete an application for admission.

• Indicate your graduate study objective when making application. You will be notified when action has been taken on your application.

• Arrange to have two official copies of transcripts from each college or university previously attended sent to the Office of Admissions unless these are already on file. It is advisable to have in your possession a complete set of transcripts (not necessarily official) to use in conferring with advisers about your program of studies. Transcripts from Cal Poly, Pomona will be available in your permanent file.

• If you have not already done so, arrange to provide test scores stipulated in the catalog. When tests are required they must be taken before admission can be approved.

• For the Master of Business Administration or the Master of Science in Business Administration degrees, take the Graduate Management Admission Test (GMAT). For any other master's degree objective, take the Aptitude Test of the Graduate Record Examination (GRE) if required by the department (see catalog). Also take the appropriate advanced test of the Graduate Record Examination if it is required.

• If you are seeking a credential, take the tests specified by the Teacher Preparation Center.

• If your native language is not English, take the Test of English as a Foreign Language (TOEFL) unless you have attended an educational institution at the secondary level or beyond in which the principal language of instruction is English. A minimum score of 550 is required but higher scores may be required in some programs.

ADMISSION AS A CLASSIFIED GRADUATE STUDENT

If you meet all departmental requirements for admission to a master's degree program, you will be enrolled as a classified graduate student. (See departmental descriptions in this publication.)

You may have some deficiencies such as course prerequisites, test scores, or grade average when applying for admission. When the graduate committee examining your application believes that you will be successful in a graduate program, it will approve your admission as a conditionally classified graduate student. The admission conditions and the time permitted you to meet them will be specified in writing. If you meet the conditions in the specified time you will be permitted to change your status to a classified student by processing form GS-17. If you fail to meet the conditions you will be subject to being dropped from the program and from the university as a graduate student.

• An unclassified, post-baccalaureate student who wishes to obtain a master's degree should see a graduate adviser to arrange for classification. The student is responsible for initiating this process. It should be done as early as possible since all credit earned by an unclassified postbaccalaureate student is subject to evaluation for acceptance toward a master's degree.

Classified students should have on file in the Graduate office and in their possession a degree program approved by an adviser or committee and verified by the Dean of Instruction. This should be prepared *as soon after admission as possible* but no later than the end of the second quarter of enrollment.

A student in a master's degree curriculum who is in unconditionally classified status is thereby advanced to candidacy for the master's degree.

ADMISSION TO CANDIDACY IN A CREDENTIAL PROGRAM

• Make application to the Teacher Preparation Center for admission to a credential program. You will obtain full information on procedures and requirements.

COMPLETION OF REQUIREMENTS FOR THE MASTER'S DEGREE

Complete all course work specified on your official program or contract. Substitutions may be made only if an appropriate petition has been approved. Satisfy all requirements included in your program, including comprehensive examination, thesis or project and the defense of the thesis or project if required by your department.

• Submit the required number of approved copies of your thesis or project to the Graduate Dean's Office, no later than the date specified in the Graduate Calendar. Pay the binding fee at the Foundation Office. *Note that some projects are not required to be bound—check with the department.*

GRADUATION WRITING TEST (GWT) REQUIREMENT

All students subject to degree requirements listed in the 1977–78 and subsequent general catalogs must demonstrate competency in writing skills as a requirement for graduation. Based on action taken by the Cal Poly Pomona Academic Senate in 1978, writing competence at Cal Poly is assessed by means of an essay and an objective test. All persons who receive undergraduate, graduate, or external degrees from Cal Poly Pomona must pass the Graduation Writing Test (GWT). Foreign students, immigrants, and permanent residents must also pass the GWT test to receive a degree.

A mandatory GWT registration policy requires that the test be taken by the quarter following the completion of 12 units (for graduate students). If the GWT is not taken by this time, a hold will be placed on a student's registration materials, and he or she will not be allowed to attend classes the following quarter unless the hold is removed. A hold on registration may be removed by signing up for the next GWT administration.

Important information about specific exemptions from the test is contained in the GWT fact sheet, which is mailed to all new students. Fact sheets may also be obtained from the flyer rack near the information desk in the Administration Building (1).

Since the GWT requirements are subject to modifications subsequent to the publication of this catalog, students are advised to check for up-to-date information on these requirements at the Test Center (Bldg. 1, Room 106).

GRADUATION

The student must be enrolled in the university during the quarter in which he/she graduates.

An application for graduation must be filed at the Office of Evaluations no later than the date specified in the calendar. The graduation fee is paid at the Cashier's Office at that time. This fee includes the diploma. Participation in the annual commencement exercises is not mandatory but is strongly recommended. Commencement ceremonies are held once a year, in June. Those not attending Commencement may obtain their diplomas from the Records Office on or after the Monday following Commencement.

Verification that the master's degree has been awarded may be secured through an official transcript, ordered from the Registrar. If a letter of verification of completion of requirements is needed prior to the availability of a transcript, it will be provided by the Office of Evaluations upon request.

THESIS OR PROJECT REQUIREMENT

• If your degree program calls for a thesis or project, obtain a copy of the university requirements for thesis and project from the Graduate Dean's Office or your adviser. Departmental requirements and style sheet data are included in that document.

• Register for course 695, project or 696, thesis. The prerequisite for these courses is classified standing and an approved committee.

Be sure to follow the format adopted by the university and your department. Unusual problems in thesis presentation, including questions on interpretation of thesis format, should be referred to the Thesis Editor in the Library as early as possible. It is your responsibility to comply with requirements as to type of paper, methods of duplication, number of copies, etc. Ask your adviser in advance how many copies you are expected to provide beyond the original.

• When the final original copy of a thesis has been signed by all committee members, usually after the oral defense, submit it to the Thesis Editor, if this has not already been done, to be sure the format complies with requirements.

GRADUATION CHECK FOR THE MASTER'S DEGREE

• No later than the beginning of the quarter preceding that in which you expect to receive the master's degree, complete an application for graduation check at the Office of Evaluations. Written notification of your status will be sent to you by the Office of Evaluations usually about three weeks after application.

Graduate and Post-Baccalaureate Admissions

POST-BACCALAUREATE APPLICATION PROCEDURES

All applicants for any type of postbaccalaureate status (e.g., master's degree applicants, those seeking credentials, and those interested in taking courses for personal or professional growth) must file a complete application within the appropriate filing period. A complete application for postbaccalaureate status includes all of the materials required for undergraduate applicants (part A) plus the supplementary graduate admissions application (part B). Postbaccalaureate applicants who completed undergraduate degree requirements and graduated the preceding term are also required to complete and submit an application and the $30 nonrefundable application fee. Since applicants for postbaccalaureate programs may be limited to the choice of a single campus on each application, redirection to alternative campuses or later changes of campus choice will be minimal. In the event that a postbaccalaureate applicant wishes to be assured of initial consideration by more than one campus, it will be necessary to submit separate applications (including fees) to each. Applications may be obtained from the Graduate Studies Office of any California State University campus in addition to the sources noted for undergraduate applicants.

Post-Baccalaureate Standing. Unclassified.

For admission to unclassified postbaccalaureate standing, a student must: (a) hold an acceptable baccalaureate degree from an institution accredited by a regional accrediting association or have completed equivalent academic preparation as determined by an appropriate campus authority; (b) have attained a grade-point average of at least 2.5 (A = 4.0) in the last 60 semester (90 quarter) units attempted; and, (c) have been in good standing at the last college attended. Admission to a California State University campus with postbaccalaureate unclassified standing does not constitute admission to graduate degree curricula.

Post-Baccalaureate Standing. Classified.

A student who is eligible for admission to a California State University campus in unclassified standing may be admitted to classified postbaccalaureate standing for the purpose of enrolling in a particular postbaccalaureate credential or certificate program, provided that such additional professional, personal, scholastic, and other standards, including qualifying examinations, as may be prescribed for the particular program by the appropriate campus authority, are satisified.

Graduate Standing. Conditionally Classified.

A student eligible for admission to a California State University campus under the unclassified post-baccalaureate standard above, but who has deficiencies in prerequisite preparation which in the opinion of the appropriate campus authority can be remedied by specified additional preparation, including qualifying examinations, may be admitted to an authorized graduate degree curriculum with conditionally classified graduate standing.

Graduate Standing. Classified.

A student eligible for admission to a California State University campus in unclassified or conditionally classified standing may be admitted to an authorized graduate degree curriculum of the campus as a classified graduate student if he or she satisfactorily meets the professional, personal, scholastic, or other standards for admission to the graduate degree curriculum, including qualifying examinations, as the appropriate campus authority may prescribe. Only those applicants who show promise of success and fitness will be admitted to graduate degree curricula, and only those who continue to demonstrate a satisfactory level of scholastic competence and fitness shall be eligible to proceed in such curricula.

Limitations on Admissions

The admission of post-baccalaureate students with no degree or credential objective may be limited or suspended because of limitations in facilities or staff. Master's degree or credential programs may be limited in enrollment whenever the lack of facilities and/or staff warrants.

Second Bachelor's Degree

Admission to seek an additional bachelor's degree for holders of such degrees is processed by the admissions office in the same way as other undergraduate admissions.

Continuing Baccalaureate Students

A student who holds a baccalaureate degree from this university and plans to continue as a post-baccalaureate or graduate student must apply for readmission by filing an application for change to Graduate Status (Form GS 17). **This should be done no later than the final quarter of the senior year.** The necessary transcripts will generally be on file, but it is the student's responsibility to be sure that requirements for readmission have been met. Such students must meet departmental admission criteria and are subject to the same enrollment quotas and application fees as are new applicants.

Re-enrollment of Continuing Graduate Students

Re-enrollment is required whenever a graduate student completes a degree objective and wishes to continue taking course work at this university.

Former Students

A former student returning to the university after an absence of more than one year must file a complete application for admission and pay the application fee.

Admission from Non-Accredited Schools

Applicants who are graduates of nonaccredited schools who give evidence of unusual promise and superior background may petition the department concerned for conditional graduate student status, and if the petition is granted may proceed in the graduate program.

Foreign Applicants

Applicants from foreign countries should contact the office of admissions or the graduate office **at least one year in advance of the quarter in which they seek admission** so that all required materials can be supplied.

Students whose native language is not English must submit the results of the Test of English as a Foreign Language (TOEFL) **prior to admission.** Minimum score of 550 required. Some departments may require a higher score. Foreign nationals who are not graduates of the university will be accepted as graduate students only if they hold a baccalaureate degree from an accredited institution in the United States or Canada or have comparable academic credentials from a foreign country. The admission of foreign students to graduate status may be limited or suspended because of facility or staff limitations.

GRE and GMAT Test Requirements

Some departments require new graduate students enrolling at this university with a degree objective to take the Aptitude Test of the Graduate Record Examination before admission. Admission generally will depend upon test scores.

The Graduate Management Admission Test is required for those who seek the Master of Business Administration degree or the degree of Master of Science in Business Administration. Some departments also require the Advanced Test of the Graduate Record Examination in their subject matter areas. Other departments require a locally developed qualification examination. See the respective departmental sections of this catalog and the chart following.

REQUIRED ADMISSION TESTS

Program	GRE (Apt.)	GRE (Adv.)	GMAT
M.S. in Agriculture*			
Master of Architecture			
M.S. in Biological Sci.			
Master of Bus. Adm.			X
M.S. in Bus. Adm.			X[1]
M.S. in Chemistry			
M.S. in Computer Science		X	
M.S. in Economics	X	X	
M.A. in Education			
Master of Engineering			
M.A. in English			
Master of Land. Arch.			
M.S. in Mathematics			
M.S. in Phys. Educ.			
Master of Urban Planning			X[1]

[1] Under 3.0 undergraduate G.P.A.

* Certain emphasis areas require the GRE—check with Department.

GRADUATE AND POST-BACCALAUREATE SCHOLASTIC REQUIREMENTS

Graduate Studies Program

STANDARDS OF GRADUATE STUDY

Graduate study deals with more complex ideas and demands more sophisticated techniques, searching analysis, creative thinking and time than undergraduate study. The research required is extensive in both primary and secondary sources and a high quality of writing is expected.

A student seeking a graduate degree enjoys certain privileges not available to other students and is obligated to follow some procedures not required of those pursuing other objectives. Careful and prompt attention to required procedures should be followed in pursuing a master's degree program to prevent unnecessary confusion and delay. Although advisory services are provided to assist students, *students alone are responsible for following the procedures and completing the steps required in a program.* Failure of an adviser to remind a student of a requirement or deadline date is not acceptable as a basis for waiver of the requirement. Requirements for advanced degrees, both procedural and substantive, may be waived only upon a written request of the student and/or committee concerned and approved by the Dean of Instruction, and by the academic school dean, if required by school policy. Petition forms are available in department offices and the Graduate Office.

Students who wish to enroll in post-graduate courses before their transcripts or test scores have been transmitted to the department concerned may receive unofficial advisement by making an appointment with a graduate adviser at the appropriate department or school office. If the students bring their own copies of transcripts with them to the conference, the adviser can make specific suggestions, but the adviser can make no formal decisions on the basis of handcarried transcripts.

REQUIREMENTS FOR MASTER'S DEGREES

Graduate programs are based upon adequate preparation at the undergraduate level. Students who plan to become candidates for a master's degree must hold a bachelor's degree substantially equivalent to that of California State Polytechnic University, Pomona in the discipline in which they intend to do their advanced work, or they must be prepared to undertake additional work to make up any deficiency.

Students seeking a master's degree at this university will submit an acceptable thesis, or project, or successfully pass a comprehensive examination.

GENERAL REQUIREMENTS

The requirements for graduation depend upon the master's degree program undertaken and upon the major field. The following requirements apply to all master's degrees offered by the university.

1. The program for the one-year master's degree must consist of not less than 45 units in courses numbered 300 and above, with a minimum of 24 units of 500- and 600-level courses completed at the university consistent with departmental requirements. Work unacceptable for graduate credit in the institution where it was taken is not acceptable for graduate credit at this university.
2. At least 32 units of upper-division and graduate-level offerings must be completed in residence at this university.
3. Two-year master's degrees have higher unit requirements than specified above. See detailed information in the appropriate sections in this catalog.
4. Candidates for the master's degree must earn a 3.0 (B) average in all graduate work taken at this university while in graduate and/or post-baccalaureate standing and in their degree programs. No course with a grade lower than "C" may apply toward the fulfillment of degree requirements.
5. A thesis, a project, or a comprehensive examination is required in all programs.
6. A favorable vote of the department, school, or center faculty is required before the degree may be conferred.
7. A graduate student who expects to receive a degree at the end of any quarter must complete an application for graduation in the Evaluations Office prior to the deadline listed in the academic calendar. **Graduates will not be permitted to participate in commencement ceremonies until all degree requirements have been met.** Degree requirements are outlined in departmental sections of this catalog. Students seeking a master's degree will be held responsible for meeting requirements applicable to the program of their choice and for fulfilling general master's degree requirements.

DEGREE PROGRAM

At the time students are admitted to a master's degree curriculum, they should arrange with the adviser to prepare an official program. If they are admitted as classified graduate students they should accomplish this step as soon as possible. A program must be prepared and submitted for approval no later than the end of the second quarter of attendance.

When the program has been approved, a copy is sent to the student and to the adviser who has approved it. The original is retained in the Graduate Studies office. A copy is sent to the Evaluations Office and is used as the official record of the student's progress toward the degree. It will be updated at least once a quarter by means of a computer printout of the complete record.

The program must meet the following specifications:

1. It must comply with the general requirements outlined above and with departmental requirements listed in this catalog.
2. The complete program may be chosen from within the offerings of the major department or it may include offerings drawn from other fields acceptable to the major adviser or committee. In developing the program, the student and adviser will seek to plan a meaningful pattern of courses focused upon the objectives of the major and the student. If the candidate has deficiencies or lacks prerequisites to enroll in certain courses necessary to a program, he/she will be expected to complete them in addition to the minimum requirements of the approved master's degree program. Advisers will permit the use of already completed courses in a master's degree program only if they clearly fit into the requirements of the student's curriculum.
3. No course in teaching methods or directed teaching may be included in a master's degree program.
4. No more than nine quarter units of credit for thesis or project may be included. The master's degree program must be approved by the candidate's departmental adviser and verified by the Dean of Instruction. The approved program is an official agreement between the institution and the candidate.

ELECTION OF REQUIREMENTS

Regulations governing requirements for a master's degree become effective when classified graduate student status is achieved.

Graduate students remaining in continuous attendance after achieving classified status may elect to meet the degree requirements in effect either at the time of their classification or at the time they complete the last requirement for the degree, except that substitutions for discontinued courses may be authorized or required by the department offering the degree.

GRADUATE ENROLLMENT PRIORITIES

Departments with high graduate enrollments may assign priorities to students wishing to enroll in graduate-level courses. Applicants for a master's degree who are in the last quarter of residence have first priority; other classified graduate degree or credential students have second priority; conditional and unclassified graduate and post-baccalaureate students have third priority. Unclassified post-baccalaureate students are admitted on a space-available basis.

MAXIMUM UNIT LOAD

The normal maximum load for graduate students is 16 units. Exceptions may be made by the adviser. A student must petition for permission to carry over 20 units in one quarter. Maximum program limits will be waived only upon presentation of evidence of the student's ability to complete successfully such a group of courses.

THESIS OR PROJECT

If a thesis or project is included in the degree program, the student may register for 695 (project) or 696 (thesis) only with approval of the major professor. Before registration for thesis, the student shall confer with the thesis adviser and have a thesis committee and a tentative subject. Each student registering for thesis or project is required to register each succeeding regular quarter until the work is complete in order to receive university services. However, total registration shall not exceed the number of units of thesis or project in the approved degree program. The student who has enrolled for the maximum number of units of thesis or project prior to completing the work, should register for 699 (Master's Degree Continuation) to avoid break in residence. During any break in residence, either non-enrollment or leave of absence, a student may not use university facilities or receive faculty assistance. When a student has failed to maintain resident status through registration or leave of absence after commencing a thesis or project, readmission to the program will require departmental approval.

A thesis or project in the official master's degree program will carry not less than three nor more than nine units of credit depending upon departmental policy. When the thesis has been completed, the committee has signed the approval page, and there has been library clearance of the thesis, the credit for course 696 will be submitted by the professor to be recorded on the official transcript. Deadline dates for submission of the thesis to the Graduate Office can be found in the Graduate academic calendar. Projects must be completed on the same time schedule but may have separate departmental rules for approval and submission.

The student must submit the approved original copy and one additional copy of the thesis to be deposited in the library. Arrangements for binding are made through the Graduate Dean's Office. Further information is contained in the thesis instructional manual available at the Graduate Dean's Office and in department offices.

The Cal Poly Kellogg Unit Foundation, Inc., has made available a loan fund for students who find it impossible to finance master's degree thesis and project costs. Up to $100 may be borrowed on a short-term basis. The loan is limited to direct costs for this purpose including research or other materials and reproduction and binding. Applications may be made through the university financial aids office.

COMPREHENSIVE EXAMINATION

A comprehensive examination is required in lieu of a thesis or project as a culminating experience for the master's degree. When a comprehensive examination is an element in a candidate's approved degree program, it must be completed satisfactorily before the student will be certified to receive a master's degree.

The comprehensive examination is administered by a departmental graduate faculty committee under the leadership of the graduate coordinator or major professor. A candidate for the master's degree at this university shall be permitted to take the comprehensive examination no more than two times. Failure to complete the

examination satisfactorily the second time will result in termination of the student's master's degree program and of further registration in the department in which the student is enrolled.

In some departments credit is given for successful completion of parts of the comprehensive examination. There may then be different criteria than stated here for full compliance. Candidates will be fully informed of any departmental variations in requirements.

FOREIGN LANGUAGE

A reading knowledge of a foreign language may be required by some departments. A student should consult the adviser or the section of this catalog in which requirements for the degree field are given.

TIME LIMIT

The graduate degree program of not less than 45 units shall be completed within five to seven years from the time the first course which applies to the degree requirements is started. This time limit, at the option of the university, may be extended for students who pass a comprehensive examination in the entire subject field or who validate the outdated work by examination which shall be certified in the student's permanent file.

ADVANCEMENT TO CANDIDACY

Advancement to candidacy for the master's degree is accorded a student upon attaining classified status in a degree program and the processing of an approved academic program contract.

Academic Policies

SCHOLARSHIP REQUIREMENTS

Graduate students, classified or conditional, will be subject to disqualification and may be disqualified from the university if their graduate grade-point average falls below 3.0 after the second quarter of attendance.

Post baccalaureate classified or conditional (credential) students will be subject to disqualification and may be disqualified from the university if their post-baccalaureate grade-point average falls below 2.75 after the second quarter of attendance.

Graduate students will be restored to good standing when they are no longer subject to disqualification. Graduate students admitted to a master's degree curriculum may be considered to be maintaining satisfactory progress provided they are fulfilling the conditions of their respective degree programs in a timely manner as determined by the graduate coordinator of the department concerned.

For graduate students subject to disqualification, the department chair or the graduate coordinator will withhold the permit to register for the following quarter. Such students can obtain release of their permits to register and re-enroll only after they have filed an "Advising Contract for Students Subject to Disqualification" which has been signed by the graduate coordinator or department chair certifying that: 1. the student has been properly counseled as to how good standing may be regained; and 2. that the student has been advised of the consequences of failure to regain good standing.

Graduate students will be automatically disqualified at the end of any fall or spring quarter if they are 9 or more grade points below a 3.0 GPA. Post-baccalaureate, classified or conditional, (credential) students will be similarly disqualified if they fall 9 or more grade points below a 2.75 GPA. Students may petition through their respective graduate coordinators and/or department chairs to the Dean of Instruction for a variance under exceptional circumstances.

MINIMUM GRADE POINT AVERAGE

If a graduate student has attempted all the courses in the approved master's degree program with less than a 3.0 (B) average, or with less than a 3.0 average in all upper division and graduate work attempted while on graduate standing, the student's major department may (1) terminate the program, or (2) require the student to take additional courses in an attempt to raise the program grade point average to the minimum 3.0. When the student's major department recommends that he/she be allowed to do the latter, the additional courses selected must:

1. Be at least two courses at the 500-699 level and total not less than six quarter units.
2. Apply directly to the student's master's degree objective, although they need not be drawn from offerings in the student's major department.
3. Be new courses (courses previously completed but not originally listed in the master's degree program may not be used).

If the student fails to earn the minimum 3.0 grade point average on completion of the revised master's degree program as outlined above, the program will be terminated without award of the master's degree.

Grades earned at another institution may not be used to offset grade point deficiencies in courses taken at this university.

TRANSFER CREDIT

If accepted by the faculty of the discipline involved, graduate credit from another accredited institution may be applied toward the master's degree.

Correspondence courses may not be used to satisfy degree requirements. Extension course work may be used to satisfy prerequisites or degree requirements when such work is acceptable to the department or school offering

the master's degree. See the appropriate sections for special regulations applying to professional master's degrees (more than 45 units).

COURSES TAKEN BY UNCLASSIFIED STUDENTS

Courses taken by students while in unclassified, post-baccalaureate standing will be accepted in fulfillment of degree requirements only if the department and graduate adviser accept them on an advanced program. Such work taken when the student is not enrolled in a program must average "B" or better with no grades below "C", if the student wishes consideration for classified status for an advanced degree.

Schools and departments shall deny enrollment in graduate-level courses to unclassified post-baccalaureate students if such enrollment will prevent degree objective students from meeting requirements or may hamper their progress toward the master's degree.

ENROLLMENT IN A NEW MASTER'S DEGREE PROGRAM

In special instances, a disqualified graduate student may be permitted to enroll in a different graduate program. All cases involving the reinstatement of disqualified graduate students must have the approval of the graduate committee in the new department.

A student in good standing in a master's degree program may transfer to another program with the approval of the new department. The amount of credit transferred from one program to another will be determined by the new department. Credit earned at this university in one master's degree program may be carried from that program to another.

CONCURRENT DEGREES

A student may not enroll for a bachelor's and a master's degree or for two master's degrees concurrently.

CHANGES IN OBJECTIVE

A change of objective may be one or more of the following:

1. Changing from one major field to another for the master's degree.
2. Changing from a credential objective to a master's degree objective.
3. Changing from a master's degree objective to a credential objective.
4. Changing from no objective to some stated objective listed in this catalog.

The evaluation of credits transferred to the university is based primarily upon the student's objective. Thus, a change in objective may affect the acceptance of transfer credits. A candidate who wishes to change his/her objective from that indicated on the original application must follow these procedures:

1. Obtain a graduate student academic petition from the Graduate Office or department office.
2. Obtain the signature of the graduate coordinator in the department to which he/she plans to transfer.
3. Submit a new graduate program in the new discipline.

A student who discontinues working for a master's degree in one department to undertake master's work in another department shall replace the first master's program by one in the new field. Degree credit may be transferred from the original program, but the transfer of credits must be approved by the new department.

GRADING SYSTEM (see undergraduate catalog section for complete definitions)

The university employs the following grading system for graduate courses:

A—Outstanding work, representing effective representation, unusual competence, and high skill.
B—Excellent work, meeting full requirements for performance at the graduate level.
C—Meets minimum requirements of the course; acceptable for graduate credit.
F—Fail; below minimum requirements of graduate courses.
CR/NC—Credit/No-Credit, see undergraduate section of catalog for definition.
I—Incomplete.
AU—Audit (no credit).
SP—Satisfactory Progress.
W—Withdrawal.
RD—Report Delayed.

Grade points are assigned as follows:

A—4 points	I—0 points
B—3 points	F—0 points
C—2 points	SP—0 points

When a grade of "D" is assigned for *undergraduate* course work taken by a graduate student, neither the credit nor the content of that course shall apply to a master's degree.

Graduate SP grades (for Project 695 and Thesis 696 only) are treated differently from undergraduate SP grades. For a graduate student a grade of SP must be completed within two years, otherwise the respective course must be repeated.

Refer to the undergraduate section of the catalog for detailed definitions of grading and administrative symbols.

Students, under the provisions of Executive Order 320, "Assignment of Grades and Grade Appeals," and Cal Poly University's "Statement of Student Rights, Responsibilities, and Grievance Procedures," may appeal grades that they consider to be unfair. In the appeal process, however, it is a basic presumption that the grades assigned to a student are correct. Thus, the burden of proof rests with the student who is appealing. For specifics of the appeal procedure, students should contact either the Dean of Instruction or the Dean of Students.

GRADUATE ACADEMIC CALENDAR—1983–84 *

FALL QUARTER, 1983

Applications and Admissions
Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs.

Academic Instruction

September 19 ..... Beginning of Academic year and fall quarter for faculty
September 22 ..... Classes begin for all students
November 11 ..... Veteran's Day—Academic Holiday
November 24–25 ..... Thanksgiving—Academic Holiday
December 5–9 ..... Final examinations
December 12–30 ..... Christmas—Academic Holiday
December 13 ..... Last day to submit approved Master's Thesis/Project for binding; Grades due

Scheduling and Registration

September 21 ..... Supplemental registration
September 20–21 ..... Orientation of new students
September 28 ..... Last day to drop classes without courses being recorded
October 3 ..... Last day to add classes or register late
October 6 ..... Last day to withdraw and receive refund of THE STUDENT SERVICES and State University fees
October 12 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons
October 21 ..... Last day to apply for current quarter graduation
November 8 ..... Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control
November 10 ..... Current deadline for next quarter scheduling

WINTER QUARTER, 1984

Applications and Admissions
Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs.

Academic Instruction

January 3 ..... Classes begin for all students
February 20 ..... Washington's Birthday—Academic Holiday
March 12–16 ..... Final examinations
March 20 ..... Last day to submit approved Master's Thesis/Project for binding; Grades due

Scheduling and Registration

December 27 ..... Orientation of new students
January 9 ..... Last day to drop classes without courses being recorded

SEPTEMBER

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

OCTOBER

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

NOVEMBER

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

DECEMBER

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

JANUARY

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

January 12 ..... Last day to add classes or register late

January 17 ..... Last day to withdraw and receive refund of THE STUDENT SERVICES and State University fees

January 23 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons

January 27 ..... Last day to apply for current quarter graduation

February 2 ..... Current deadline for next quarter scheduling

February 16 ..... Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

FEBRUARY

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29			

SPRING QUARTER, 1984

Applications and Admissions

Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs.

Academic Instruction

March 26 ..... Classes begin for all students

May 28 ..... Memorial Day—Academic Holiday

June 4-8 ..... Final examinations

June 7 ..... Grades due for graduating seniors

June 6 ..... Last day to submit approved Master's Thesis or Project for binding

June 9 ..... Commencement

June 12 ..... Grades due

MARCH

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Scheduling and Registration

March 22 ..... Orientation of new students

March 30 ..... Last day to drop classes without courses being recorded

April 4 ..... Last day to add classes or register late

April 9 ..... Last day to withdraw and receive refund of THE STUDENT SERVICES, and State University fees

April 13 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons

April 13 ..... Last day to apply for current quarter graduation

May 10 ..... Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

April 27 (Su) ..... Current deadline for next
May 18 (F) ..... quarter scheduling

APRIL

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

MAY

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

SUMMER QUARTER, 1984

Applications and Admissions

Applications will be accepted into any program until capacity is reached up to the beginning of the quarter except for impacted programs.

Academic Instruction

June 18 ..... Beginning of university year. Classes begin for all students

JUNE

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

July 4 ..... Independence Day—Academic Holiday

August 27–30 ..... Final examinations

September 6 ..... Last day to submit approved Master's Thesis/Project for binding; Grades due

Scheduling and Registration

June 14 ..... Orientaion of new students

June 25 ..... Last day to drop classes without courses being recorded

June 28 ..... Last day to add classes or register late

July 2 ..... Last day to withdraw and receive refund of THE STUDENT SERVICES fees

July 12 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons

July 19 ..... Last day to apply for current quarter graduation

July 26 ..... Current deadline for next quarter scheduling

August 2 ..... Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

JULY

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

AUGUST

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

* NOTE: Some academic calendar dates may be subject to change subsequent to publication of the catalog. For the purposes of degree evaluation the academic year is defined as Fall, Winter, Spring, and Summer quarters.

AGRICULTURE

Master of Science in Agriculture

Agricultural Science Option

In the Department of Agricultural Science/Vocational Agriculture, School of Agriculture

Flint Freeman, *Chair*

Richard M. Hylton, *Graduate Coordinator*

The Master of Science in Agriculture with a program in Agricultural Science will provide the student the opportunity to enhance his knowledge and competence in a selected area of specialization as well as to encourage individual study and research. This curriculum is designed to aid the vocational agriculture teacher to become more competent in carrying out his/her professional responsibilities, develop subject matter competence, and attain a proficiency in the utilization of microcomputers. The attainment of a master's degree also permits the qualified candidate to pursue further specialized training, gain entrance to professional schools, or study towards a Ph.D. degree. Students desiring additional training with industry can include as part of their program an internship with an industry of their choice.

Admission to the Program

An applicant for admission to the master's degree program in agricultural science must have a baccalaureate degree in Agriculture or complete prescribed prerequisites. An undergraduate grade point average of 2.5 or better and completion of the general aptitude portion of the GRE test are required for unconditional admission. In addition, the Department of Agricultural Science/Vocational Agriculture must be in receipt of three letters of recommendation from individuals familiar with the applicant's academic qualifications and potential as a graduate student. Applicants not meeting these standards may be conditionally admitted with the approval of the Department of Agricultural Science/Vocational Agriculture. The conditional student must comply with the requirements of the conditional admission within two quarters of that admission.

The student along with an appointed advisory committee will develop a program based on the student's interests and preparation. The candidate's approved program will include required basic core courses, a selection of additional courses in a specialization, electives, independent study, and a thesis or project.

REQUIREMENTS

1. The degree program shall include a minimum of 45 quarter units of which at least 24 units shall be in graduate level courses. Deficiencies in undergraduate preparation must be made up in addition to the 45 quarter units required for the degree.
2. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution including units taken through continuing education.
3. The candidate will not be able to use more than 13 units of acceptable graduate credit that has been petitioned as an undergraduate student. Graduate students enrolled in the Single Subject Credential program who have completed their undergraduate degree may complete more than 13 units of the Master's program prior to admission under the following conditions:
   a. The candidate must meet the requirements for unconditional admission into the Master's program.
   b. Prior permission from the department Graduate Coordinator must have been obtained.
4. The student will develop a program based upon the curriculum outline that follows, in consultation with the major professor and the department Graduate Coordinator.
5. The candidate must complete a formal project or thesis and submit two final copies for binding in accordance with University regulations.
6. A final oral examination covering the project or thesis and the candidate's area of specialization must be successfully completed.

Curriculum

Required Courses		Units
ABM 375	Data Management *AND*	4
ABM 476	Statistical Analysis for Agriculture	3
	OR	
ABM 375	Data Management *AND*	4
AS 545	Design and Analysis of Experimental Research	4
AG 505	Young and Adult Programs and Adult Leadership	3
AG 510	Diffusion of Innovations in Agriculture	3
AG 530	Program Planning & Development	3
AG 550	Seminar in Agriculture	3
AG 690	Agricultural Science Research	3–6
AG 696	Thesis	3
	OR	
*	Comprehensive Exam	0
		25–29

* Students electing this option will include 3 additional units of electives in their program.

Agricultural Science Specialization Courses

To be selected with consent of the student's major professor and graduate committee.....15

Elective Courses

To be selected from graduate-level courses with consent of the student's advisor.....2–10
Total.....45

Graduate Course Descriptions

AG 505 Young and Adult Programs and Adult Leadership (3)

Organization, history, philosophy, administration and procedures in advising Future Farmer Chapters and conducting classes for out-of-school youth and adults. Surveys and plans for development of rural and urban adult programs. F.F.A. and Young Farmer programs, techniques and methods. 2 lectures, 1 activity.

AG 510 Diffusion of Innovations in Agriculture (3)

A study of the agricultural community and the process through which innovations are implemented utilizing mass media, microcomputer utilization for classroom and the agricultural industry, scientific information, and results of progressive agriculturalists. 3 lectures.

AG 530 Program Planning and Development (3)

Study of career opportunities in agriculture. Program development in such areas as the Future Farmers of America, and other youth groups. Supervised practice including cooperative work experience in agriculture. Development of up-to-date approaches in an integrated program. Operating policies and procedures. 3 lectures.

AG 540 Evaluation of Vo-Ag Programs (3)

Evaluation of vo-ag departments. Emphasis given to a well-balanced program providing instruction, supervised occupational experience, and youth activity. Two lectures, one 2-hour activity.

AG 550 Seminar in Agriculture (1–3)

Current findings and research problems in the field of agriculture and their application to the industry. Each seminar to have a subtitle identifying the discipline. Seminar, 1 to 3 hours. Maximum of six units may be earned. Prerequisite: Consent of instructor.

AG 560 Internship (1–6)

On-the-job experience with public and private agencies for graduate students. Professional experience new to the student to enhance the level of competence in agriculture. One unit credit for each 40 hours of experience. Written reports necessary. Approval required before enrolling. Prerequisite: Graduate standing.

AG 580 Current Issues in Vocational Education (3)

Recent Developments in vocational education including job market, staffing, funding, state and federal legislation. Delivery systems for subject matter programs in vocational education and their relationship to local educational agencies (L.E.A.'s). Three lectures.

AG 690 Agricultural Science Research (3–6)

Individual research in area of specialization under direction of graduate faculty. May be repeated for a maximum of 6 units.

AG 691 Directed Study (1–2)

Individualized research in a specialized area under the direction of major professor.

AG 696 Thesis (3)

Compilation of data culminating in the summarizing and reporting in thesis form of independent supervised research. Prerequisite AG 690.

AG 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. The student must be enrolled in the university during the quarter he/she graduates.

Master of Science in Agriculture

Animal Science Option

In the Department of Animal Science, School of Agriculture

G. Duane Sharp, *Chair*

Melinda Burrill, *Graduate Studies Coordinator*

The Master of Science degree program in Agriculture with an option in Animal Science will provide the student the opportunity to enhance his knowledge and competence in a selected area of specialization as well as to encourage individual study and research. The curriculum is planned to expose the candidate to research techniques and the use of scientific literature, and to prepare him for positions of responsibility in animal production, business, or the related animal industries. The attainment of a master's degree also permits the qualified candidate to pursue further specialized training, gain entrance to professional schools, or study towards a Ph.D. degree. The degree program also includes an internship through which students may complement their theoretical and technical studies and assure industrial orientation. The student in this program may pursue one of several areas of Animal Science: animal nutrition, animal breeding, meat science, or physiology.

ADMISSION TO THE PROGRAM

An applicant for admission to the master's degree program in Animal Science must have a baccalaureate degree in Animal Science or in a related area. An undergraduate grade point average of 2.5 or better with a 3.0 average in all animal science courses and a minimum of college algebra and trigonometry are required for unconditional admission. In addition, the Department of Animal Science must be in receipt of three letters of recommendation from individuals familiar with the applicant's academic qualifications and potential as a graduate student. Applicants not meeting these standards may be conditionally admitted with the approval of the Department of Animal Science. The conditional student must comply with the requirements of the conditional admission within two quarters of that admission.

The student along with an appointed advisory committee will develop a program in a selected area of Animal Science based on the student's interest and preparation. The candidate's approved program will include required basic core courses, a selection of additional courses in a specialization, electives, independent study, and a thesis.

REQUIREMENTS

1. The degree program will include a minimum of 45 quarter units of which at least 24 units shall be in graduate-level courses. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. Deficiencies in undergraduate preparation must be made up in addition to the 45 quarter units required for the degree.
2. The student will develop a program based upon the curriculum outline that follows, in consultation with the major professor and the graduate advisory committee.
3. The candidate must complete a formal thesis and submit at least two final copies for binding in accordance with University regulations.
4. A final oral examination covering the thesis and the candidate's area of specialization must be successfully completed.

CURRICULUM

Required Courses

	Units
Design and Analysis of Experimental Research (AS 545)	4
Animal Science Seminar (AS 670)	1–3
Animal Science Research (AS 690)	3–9
Thesis (AS 696)	3
	11–19

Animal Science Specialization Courses

To be selected with consent of the student's major professor and thesis committee	22–30

Elective Courses

To be selected from graduate level courses with consent of the student's advisor	4–7
Total	45

GRADUATE COURSE DESCRIPTIONS

AS 512 Nutritional Energetics (4)

The biochemical, physiological, and nutritional functions of energy transformation involved in the formation of animal products. Lecture-discussion, 4 hours. Prerequisite: Monogastric or ruminant nutrition, physiology, and biochemistry, or permission of instructor.

AS 514 Population Genetics (3)

The population concept of genetics. The forces influencing gene frequencies in both equilibrium and dynamic populations; the development of breeding programs. Lecture-discussion, 3 hours. Prerequisite: AS 404 and BIO 411.

AS 545 Design and Analysis of Experimental Research (4)

Experimental statistics. Applications of statistical estimation and inference. Linear regression and correlation; analysis of variance for completely randomized design, randomized blocks, Latin squares, factorials and analysis of covariance. Concepts of design for experimental investigations. Lecture-discussion, 4 hours, prerequisite: BIO 411.

AS 547 Advanced Meat Science (3)

Microstructure and chemistry of skelatal muscle and connective tissue. Chemical and physical changes during the conversion of muscle to meat and their relationship to meat quality and processing. Meat preservation. Analytical methods. Lecture-discussion, 3 hours. Prerequisite: AS 427, CHM 321, or consent of instructor.

AS 560 Graduate Internship in Animal Science (1-4)

On-the-job experiences in areas of animal science that best complement the professional objective of the student. Prerequisite: Consent of internship coordinator. May be repeated for a maximum of four units.

AS 599 Special Topics for Graduate Students (1-4)

Group study of a selected topic, the title to be specified in advance. Total credit limited to 4 units. Prerequisite: permission of major professor and graduate committee. Instruction is by lecture, laboratory or a combination of both.

AS 670 Animal Science Seminar (1-3)

Study of selected topics in animal science. Each seminar subtitled to describe its emphasis. Seminar 1 to 3 hours. Prerequisite: Consent of instructor.

AS 690 Animal Science Research (1-3)

Individual research in area of specialization under direction of major professor. May be repeated for a maximum of 9 units.

AS 691 Directed Study (1)

Individual research in a specialized area under direction of graduate faculty. May be repeated. Maximum credit 4 units.

AS 696 Thesis (1-3)

Compilation of data culminating in the summarizing and reporting, in thesis form, of independent supervised research. Prerequisite: AS 690.

AS 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. The student must be enrolled in the university during the quarter in which he/she graduates.

AGRICULTURE

MASTER OF SCIENCE IN AGRICULTURE

Nutrition and Food Management Option in the Department of Foods and Nutrition and Home Economics

Ruby Beilby, *Department Chair*

Kara Caldwell, *Graduate Studies Coordinator*

The Master of Science in Agriculture with the option in Nutrition and Food Management is designed to provide in depth study of the principles and application of nutritional sciences and food management. The program is structured in a manner to meet the objectives of both the generalist and those seeking specialization in one of the following areas: nutritional biochemistry, community nutrition or food service management. The successful candidate will acquire skills to pursue careers in teaching, research, community service, industry or pursue advanced graduate studies. The teaching format includes lectures, laboratory work, field training, seminars and independent research.

ADMISSION TO THE PROGRAM

An applicant for admission to the master's degree program in Nutrition and Food Management must have a baccalaureate degree in Foods and Nutrition or a baccalaureate degree with a minimum of 24 quarter units of upper division courses in foods and nutrition and 12 units in closely related areas such as biochemistry, physiology, bacteriology, management or accounting to be admitted as a classified student. Science classes, physiology, biochemistry, bacteriology, will include a minimum of 3 hours laboratory experience per week. An undergraduate grade point average of 3.0 is required for unconditional admission. In addition, the Department of Foods and Nutrition and Home Economics must be in receipt of three letters of recommendation from individuals familiar with the applicant's academic qualifications and potential as a graduate student. Applicants not meeting these standards may be conditionally accepted and must comply with the requirements of the conditional admission within two quarters of that admission.

The student along with an appointed advisory committee will develop a program in a selected area of Nutrition and Food Management based on the student's interest and preparation. The candidate's approved program will include required core courses, a selection of additional courses in a specialization, electives and a thesis.

REQUIREMENTS

1. The degree program shall include a minimum of 45 quarter units of which at least 24 units shall be in graduate level courses. No more than 13 units of acceptable graduate credit may be transferred from another graduate institition. Deficiencies in undergraduate preparation must be made up in addition to the 45 quarter units required for the degree.
2. The student will develop a program based upon the curriculum outline that follows, in consultation with the major professor and the departmental graduate committee.
3. The candidate must complete a formal thesis and submit two final copies for binding in accordance with University regulations.
4. A final oral examination covering the thesis and the candidate's area of specialization must be successfully completed.

CURRICULUM

Required Courses		*Units*
ABM 375	Data Management AND	3
ABM 476	Statistical Analysis for Agriculture	4
OR		
FN 520	Food Chemistry and Toxicology	4
FN 538	Research Methods in Nutrition	2
FN 670	Seminar	1–3
FN 690	Research	3–9
FN 696	Thesis	3
		23–31

Nutrition and Food Management Specialization Courses

To be selected with consent of the student's major professor and thesis committee 14–22

Graduate Course Descriptions

FN 520 Food Chemistry & Toxicology (3)

Advances in the chemistry of food materials. Toxicological procedures and data relating to food additives. Nutrient-drug interaction. Three lectures. Prerequisite: FN 420 or equivalent.

FN 533 Advanced Nutrition (3)

Coordination of structure and function as related to the metabolic needs of the cell and its response to the environment. Interactions of nutrients and other substances. Inter-relationships of biochemistry, physiology and nutrition. Comprehensive study of control of food intake. Prerequisite: FN 434.

FN 535 Recent Advances in Nutrient Metabolism (2-3)

Recent developments and research in nutrient metabolism. A major nutrient class (proteins, fats, carbohydrates, vitamins and minerals) to be studied during each quarter.

Each course to be subtitled identifying the nutrient class to be discussed. 2–3 hours. Maximum of nine units may be earned. Prerequisite: Advanced nutrition courses or equivalent or consent of instructor.

FN 536 Nutrition through the Life Cycle (3)

Nutrient requirements and food needs as modified by developmental and behavioral changes during pregnancy and lactation, periods of growth, adulthood and old age. Planning diets to promote and maintain health of specific age groups. Survey and interpretation of pertinent dietary guidelines used by various health agencies. Prerequisite: FN 433, or equivalent.

FN 538 Research Methods in Nutrition (2)

Contemporary research techniques and methods used in the field of nutrition. Interpretation of data in relationship to the nutritional status of humans and experimental animals. 1 lecture, 1 3-hour laboratory. Prerequisite: FN 433, 445 or consent of instructor.

FN 540 Field Experience in Foodservice Industry (2)

Foodservice preparation and delivery systems will be studied. Students will travel to actual locations: fast food, restaurants, hotels, hospitals, schools, convalescent homes, university, airlines and other. Prerequisites: FN 351, 452.

FN 543 Diet Therapy (3)

Study of the physiological and biochemical changes imposed on the body by certain diseases and dietary modifications used for treatment. Adaption of dietary patterns of individuals to special needs of disease states and preventative care. Prerequisite: FN 433 or equivalent.

FN 545 Nutritional Assessment (3)

Survey techniques as a tool for nutritional evaluation. Role of clinical evaluation in nutritional assessment of groups and individuals. Prerequisite: FN 445, or equivalent.

FN 550 Independent Study in Foodservice (2-6)

Field work in foodservice under faculty guidance. Designed to meet individual student needs for participative or design projects in all phases of foodservice. Project results are presented in a formal report. Prerequisites: FN 351, 452.

FN 560 Clinical Experience (8-9)

Independent clinical experience in an area chosen by the student under the supervision and direction of a graduate faculty member. Prerequisite: Consent of Instructor.

FN 670 Seminar (1-3)

Study of selected topics in Foods and Nutrition. Each seminar subtitled to describe its emphasis. Seminar 1 to 3 hours. Prerequisite: Consent of instructor.

FN 690 Research (1-3)

Individual research in area of specialization under direction of graduate faculty. May be repeated for a maximum of 9 units.

FN 691 Directed Study (1)

Individualized research in a specialized area under the direction of major professor.

FN 696 Thesis (1-3)

Compilation of data culminating in the summarizing and reporting, in thesis form, of independent supervised research. Prerequisite: FN 690.

FN 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. The student must be enrolled in the university during the quarter in which he/she graduates.

ARCHITECTURE

MASTER OF ARCHITECTURE

In the Department of Architecture, School of Environmental Design

Paul Helmle, *Acting Chair*

Patricia Oliver, *Graduate Coordinator*

The Department of Architecture offers a program of study which leads to the degree, Master of Architecture. Students from varied backgrounds are accepted into the Master's program.

A one-year program, leading to a Master of Architecture provides advanced study for students already holding the Bachelor of Architecture degree. The program is best suited for students whose undergraduate work in architecture, or whose subsequent professional work demonstrates the intelligence, curiosity, self-discipline and creativity necessary for graduate work. A minimum of 48 quarter units of academic work must be completed in this program prior to receiving the Master of Architecture degree. A sequence of four areas of study is currently available within the graduate program. These include design and theory, design and technology, urban design and interior architecture. It may also be possible to arrange an area of concentration through the Departments of Urban Planning or Landscape Architecture in the School of Environmental Design, or through the School of Engineering. An independent sequence may be arranged with the prior approval of the graduate coordinator. The area of concentration must be selected, in consultation with the graduate coordinator, no later than the first week of the first quarter in the program. The Master of Architecture, second professional degree, is considered to be a teaching, as well as an advanced, degree. Students in this program may be required to assist in the teaching of the undergraduate students and to share the benefits of advanced study with them through both formal and informal means.

For students with no previous study in architecture, three years of intensive prerequisite course work precedes the Master of Architecture program. Students are strongly urged to complete courses in College Algebra, Trigonometry, and Physics prior to beginning this program, since they are prerequisites to the study of Structures and Environmental Controls. Failure to take these courses in advance may lengthen the program by as much as two quarters.

Students holding a non-professional Bachelor of Arts or Bachelor of Science degree, with a major in architecture, are encouraged to apply for advanced standing within the undergraduate program. Normally, one year of study in this program would lead to the professional Bachelor of Architecture degree, at which time application can be made for the one year, second professional degree, Master's program.

Prior to graduation all students are required to fulfill a minimum of 1000 hours of work with a registered architect or engineer. This work must be verified by the department's Coordinator of Professional Practice and Cooperative Education. This is waived for students holding a Bachelor of Architecture from California Polytechnic University, Pomona.

Each year approximately 35 full and part-time faculty in the Department of Architecture conduct classes for the more than 600 students, including 75 graduate students, enrolled in its various programs. The Department is a member of the Association of Collegiate Schools of Architecture. Most of its faculty hold professional degrees in architecture and are registered architects. Many are also members of the American Institute of Architects, or other professional associations. The Master of Architecture as a first professional degree is accredited by the National Architectural Accrediting Board.

ADMISSION TO THE PROGRAM

For admission to the Master of Architecture program an applicant must have received a baccalaureate degree, have attained an overall undergraduate grade point average of at least 2.80, and have achieved at least a 3.00 grade point average in the last 90 quarter or 60 semester hours of work. An applicant who does not meet these criteria may be admitted on a provisional basis if evidence of compensating qualifications can be furnished. Students may enter the Master of Architecture program in the fall quarter only.

In addition to the standard University application forms which must be submitted to the University Admissions Office, the Department of Architecture requires the folllowing: (1) official transcripts of all college work, (2) a portfolio of creative work in architecture and related areas, (3) a statement of purpose or intentions in applying to the program, and (4) three letters of recommendation from acquaintances in a position to assess the applicant's potential for either the profession of architecture, or a Master's level academic program. Personal interviews are not required. The Graduate Record Examination (GRE) is recommended but is not required. Applicants should contact the Department of Architecture for the critical dates in the admission process. March 1 is the usual deadline for all application materials. Applicants will be notified of the decision of the departmental admissions committee by April 15 or as soon thereafter as possible.

Upon admission to the Department of Architecture the student will meet with the coordinator of the graduate program to prepare a reasonable sequence of course work. The curriculum thus specified may be altered only by written request submitted in accordance with University regulations.

REQUIREMENTS AND CONDITIONS

1. For the one year Master of Architecture program a minimum of 48 quarter units must be completed. In the four

year program as many as 200 quarter units may be required. No work below the 300 level will be accepted in the program. In the one year, second professional degree program no more than 14 units of 400 level work will be accepted.

2. All course work must be completed in residency, unless prior consent is granted by the Graduate Studies Committee for each off-campus course. Title 5 of the Education Code requires a minimum of 32 units of coursework in residence.
3. An overall average of "B" (3.0) or better must be maintained in order to receive a graduate degree. The minimum grade in architecture courses which will be accepted for credit toward the degree is "C." Any course in which a lower grade is received must be retaken, but the initial grade will not be removed from the student's record nor from the calculations for the grade point average.
4. A student must be enrolled in a miminum of 6 and a maximum of 18 quarter units of work per quarter. In order to take more than 18 units per quarter, the student must obtain prior approval of the graduate coordinator.
5. A final project is required of students in the one year program. The student must submit a written proposal outlining the goals, procedures and intentions of this independent project, and receive approval for it from the department's Graduate Studies Committee prior to enrolling in the project course. Three faculty members, chosen to serve as the student's project advisors, must also receive copies of the proposal.
6. Credit will not be awarded for the same course in both the Baccalaureate and Master's programs in Architecture.
7. All class work becomes the property of the department and will be retained or returned at the discretion of the faculty.

PROGRAM FOR THE MASTER OF ARCHITECTURE

First Professional Degree

PREREQUISITE COURSES

Normally met by students who hold the Bachelor of Architecture Degree

Trigonometry	MAT	106	*
College Algebra	MAT	105	*
College Physics	PHY	121, 122, 141, 142	*

* These courses are prerequisites for courses in structures and environmental controls. Neither the grade nor the units are considered as part of the student's program.

Architectural Design	ARC	301	8
Architectural Design	ARC	302	8
Architectural Design	ARC	303	8
Structures	ARC	321	4
Structures	ARC	322	4
Structures	ARC	323	4
Environmental Controls	ARC	331	4
Environmental Controls	ARC	332	4
Energy Conservation	ARC	333	4
Ancient and Medieval Architecture	ARC	361	4
Renaissance and Baroque Architecture	ARC	362	4
Nineteenth and Twentieth Century Architecture	ARC	363	4
Architectural Design	ARC	405	8
Architectural Design	ARC	406	8
Architectural Design	ARC	407	8
Seismic Design in Architecture	ARC	424	4
Advanced Structures	ARC	425	4
American Architecture	ARC	464	4
Contemporary Architecture	ARC	465	4
Architectural Practice	ARC	471	4
Architectural Design	ARC	501	8
Architectural Design	ARC	502	8
Architectural Design	ARC	503	8
Environmental Psychology	PSY	420	4
Computer Science (upper division)	CS	101	4
Landscape Architecture	LA	321	3
Urban Planning	UP	301	4
Approved Electives			4
Total Prerequisite Units			147

FINAL YEAR PROGRAM

Architectural Design	ARC	601	8
Project Research and Design	ARC	602	8
Theory of Architecture	ARC	653	4
Project Preparation	ARC	690	2
Project	ARC	695	8
Electives (selected from list on previous page)			18
Total Units			48

PROGRAM FOR THE MASTER OF ARCHITECTURE

Second Professional Degree

Architectural Design	ARC	601	8
Project Research and Design	ARC	602	8
Theory of Architecture	ARC	653	4
Project Preparation	ARC	690	2
Project	ARC	695	8
Electives			18
Total Units			48

Elective courses are to be selected from the following list:

Advanced Structures	ARC	426	4
Acoustics	ARC	434	4
Lighting	ARC	435	4
Conditioning Air	ARC	436	4
Architectural Practice	ARC	472	4
The Architect and the Development Process	ARC	473	4
The Architect and the Computer	ARC	474	4
Advanced Building Construction	ARC	541	4
Topics in Architecture	ARC	552	4
Directed Study	ARC	591	2-8
Directed Study	ARC	592	2-8
California Architecture	ARC	666	4
Topics in Design History	ARC	667	4
Behavioral Factors in Architecture	ARC	681	4
Behavioral Factors in Architecture	ARC	682	4
Behavioral Factors in Architecture	ARC	683	4
Directed Research	ARC	691	4

Other electives must receive prior approval of the Graduate Coordinator.

Graduate Course Descriptions

NOTE: For graduate prerequisites course descriptions, see undergraduate section.

ARC 501 Architectural Design (8)

Studies of basic design and communication skills; discussion of general aspects of ecological, human, aesthetic and technological factors as architectural design determinants. For Master of Architecture only. Prerequisite: Matriculation into the Master of Architecture program. Lecture, 5 hours; laboratory, 9 hours.

ARC 502 Architectural Design (8)

Problems of design and their interactions with the process of design; procedures and methods related to architectural design application. Prerequisite: ARC 501. Lecture, 5 hours; laboratory, 9 hours.

ARC 503 Architectural Design (8)

Emphasis on the thorough design and design development of a program or programs and includes design detailing and preliminary working drawings. Prerequisite: ARC 502. Lecture, 5 hours; laboratory, 9 hours.

ARC 541 Advanced Building Construction (4)

Studies of construction techniques as they relate to actual case studies found in the practice of architecture. Prerequisite: ARC 341. Lecture: 4 hours.

ARC 552 Topics in Architecture (4)

The study of topics important in the profession today and in the near future. This course will be conducted in a seminar format by instructors from private practice. Prerequisite: ARC 303. Lecture: 4 hours.

ARC 591 Directed Study (2–8)

ARC 592 Directed Study (2–8)

Directed study on a subject of interest to the student and important to the understanding of architecture. Prerequisite: Prior approval of the proposal by the Graduate Studies Committee.

ARC 601 Architectural Design (8)

The interaction of design methods, user needs, and site constraints explored in design projects. Prerequisite: Matriculation into the Master of Architecture program. Lecture, 5 hours; laboratory, 9 hours.

ARC 602 Research (8)

Development of a design project or written thesis proposal into a cohesive program to be used as the basis of the final quarter's studio work. Prerequisite: ARC 601. Lecture, 5 hours; laboratory, 9 hours.

ARC 653 Theory of Architecture (4)

Explorations into polemics, methodologies and ideals of architecture; an overview of the ideologies which form the basis of the architectural process. An exposure to simultaneous concerns in other disciplines. Prerequisite: ARC 362. Lecture: 4 hours.

ARC 666 California Architecture (4)

The history of California architecture from the early Spanish explorers through contemporary times. This class will study architecture as well as investigate early technological advances and its effects on design in California. Significant personalities as well as significant buildings will be discussed in slide and lecture format. Prerequisite: ARC 464. Lecture: 4 hours.

ARC 667 Topics in Design History (4)

This course will investigate design methods employed by historical figures in architecture. Prerequisite: ARC 464. Lecture: 4 hours.

ARC 681 Behavioral Factors in Architecture (4)

Relationship of the concepts of psychology, social anthropology and sociology to the design of the built environment. The effects of architecture on its users. The relationship of social patterns and cultural mores to urban patterns. Prerequisite: Graduate Status. Lecture: 4 hours.

ARC 682 Behavioral Factors in Architecture (4)

A course designed to study methods of programming and project evaluation in the development of architectural design work. Prerequisite: ARC 681. Lecture: 4 hours.

ARC 683 Behavioral Factors in Architecture (4)

A course designed to study in a seminar format case studies of the application of behavioral factor principals in the design process. Prerequisite: ARC 682. Lecture: 4 hours.

ARC 690 Project/Thesis Preparation (2)

Seminar for discussion of relevant environmental planning, architectural and technological issues directed toward the development of the project/thesis topic with emphasis upon the development of an approved written thesis proposal. Prerequisite: ARC 407. Discussion: 2 hours.

ARC 691 Directed Research (2)

This course allows the student to conduct empirical research or replication studies on a topic of importance to architecture demonstrating the student's skills and judgment. Prerequisite: ARC 601.

ARC 695 Project (8)

Development of the program and preliminaries executed in ARC 602 into a design project demonstrating the student's skills, knowledge and judgment. Prerequisite: ARC 602.

ARC 696 Thesis (8)

Development of the program and preliminaries executed in ARC 602 into a concluding written thesis subject to University format demonstrating the student's skills, knowledge and judgment. Prerequisite: ARC 602.

ARC 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of the grade SP in continuing work in which the student intends to use facilities of the University. Registration permitted instead of leave of absence when student plans to use University facilities. The student must be enrolled in the university during the quarter in which he/she graduates.

BIOLOGICAL SCIENCES

MASTER OF SCIENCE IN BIOLOGICAL SCIENCES

In the Department of Biological Sciences, School of Science

Don C. Force, *Chair*

Departmental Graduate Committee

[redacted], *Zoology*
J. Curtis Clark, *Botany*
Pamela J. Sperry, *Biology*
Bijay K. Pal, *Microbiology*
Glenn R. Stewart, *Zoology*
Ronald D. Quinn, *Biology*

The Master of Science degree program in the Biological Sciences will enhance the knowledge and competence of the candidate in the chosen field of specialization as well as develop potential for continuing self-directed study and research. The curriculum is planned to provide theoretical, technical, and practical studies which will increase the student's knowledge of the discipline, educate the student in research techniques, and promote the familiarity with and critical evaluation and use of the scientific literature. Graduate study specializations may be elected in the disciplines of the biological sciences: biology, botany, microbiology, and zoology.

Admission to the Program

Applicants for admission to this program must have a bachelor's degree with a major in one of the disciplines of the biological sciences or a related field. The minimum requirements for admission are: 24 quarter units in upper division biological sciences, 15 quarter units in chemistry and 12 quarter units in physics and/or mathematics. These courses must be comparable to those required for a baccalaureate major at this University.

An undergraduate grade point average of 2.5 or better with a 3.0 average in all upper division work is required for admission to the Master of Science degree program in the biological sciences. In addition to the grade requirements, the applicant must supply evidence of significant potential for research through a personal statement and at least three letters of recommendation from professionals qualified to judge the applicant. Admission to the program will be determined by the Graduate Committee based on the total record of the applicant.

All applications must be complete by the fifth week of the quarter preceding anticipated entry into the program. Applications will not be processed during the summer quarter.

The classified graduate student with an advisory committee will develop a program in the candidate's selected discipline of biology based upon interests and preparation. The student's approved program will include required core courses, a selection of additional formal courses in a specialization, independent study and an appropriate thesis. It will normally constitute 45 to 50 quarter units of credit.

Requirements

1. The degree program must include a minimum of 45 quarter units, including no more than 13 acceptable units transferred from another graduate institution. No more than 21 units may be in approved 400-level courses.
2. All requirements specified by the university and by the student's thesis committee must be met.
3. The student must complete the program based upon the curriculum outlined below.
4. An acceptable thesis must be completed and four final copies submitted for binding in accordance with university regulations.
5. A final oral examination must be successfully completed.
6. The degree program must be completed within five years of the quarter the student was first admitted as a classified graduate student.

Curriculum

Required Courses

	Units
Seminar in Biology (BIO 680)	3
Research in Biological Sciences (BIO 692)	6
Thesis (BIO 696)	3
	12

Courses in a Specialization

To be selected with consent of the student's thesis committee from 500 and 600-level courses, 33-38 units including not more than 21 units of approved 400-level courses.

Total	45–50

Graduate Course Descriptions

BIO 510 Cytogenetics (3) F

Nuclear and cytoplasmic structures and phenomena as related to inheritance. Lecture-discussion, 2 hours, laboratory, 3 hours. Prerequisite: BIO 303. *Campbell, Martinek.*

BIO 515 Plant Biosystematics (4) F

Theoretical and technical aspects of plant biosystematics; principles and techniques used in the study of relationships within and between plant species; application of experimental techniques to the study of plant diversity. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 213, BIO 303, BIO 325 or consent of instructor. Recommended: BIO 306, BIO 530, BOT 343. *Clark.*

BIO 520 Endocrinology (4) Sp

Study of the endocrine glands and their role in growth development, metabolic regulation, and reproduction in animals. Lecture-discussion, 3 hours, laboratory, 3 hours. Prerequisite: CHM 327, ZOO 424 and/or consent of instructor. *Stiffler.*

BIO 521 Renal Physiology (3) W 1985

Elements of epithelial transport function with special reference to the kidney. Current research on renal function will be stressed. 3 lectures. Prerequisite: ZOO 424. *Stiffler.*

BIO 525 Ecology of Fungi (4) Sp 1985

Autecology and synecology of fungi in soil, water, atmosphere, living and dead tissues, and other environments; saprophytism; commensalism, mutualism, and parasitism; methods of collection, isolation, and ecological study; some independent study required. Lecture-discussion, 2 hours, laboratory, 6 hours. Prerequisite: BOT 425, BOT 426; BIO 325 or BOT 421 recommended; or consent of instructor. *Stoner.*

BIO 527 Pollination Ecology (3) Sp

Principles of reproduction in flowering plants via the use of animal vectors. Special interest will be given to synchronous life cycles of plants and pollinators. 2 lectures, 1 three-hour lab. Prerequisite: BIO 325, BOT 343. *Szijj.*

BIO 528 Community Ecology (3) F

Patterns in the diversity, relative abundance, and manner in which communities of plant and animal species are assembled. Competition, co-existence strategies, and their effect on community structure within the framework of natural selection. 3 lectures. Prerequisite: BIO 325. *Moriarty.*

BIO 530 Mechanisms of Speciation (3) W 1985

Principles and concepts of evolutionary mechanisms in plants and animals. Lecture-discussion, 3 hours. Prerequisite: BIO 213, BIO 303, BIO 325. *Edmonds.*

BIO 534 Water Pollution Biology (5) F 1984

Effects of pollution on aquatic organisms. Emphasis on experimental investigation in laboratory and field. 3 lectures; 2 three-hour laboratories. Prerequisite: Consent of instructor. *Staff.*

BIO 535 Advanced Cell Biology (4) W 1984

Molecular, ultrastructural and functional approach to cell biology. Lecture-discussion, 4 hours. Prerequisite: Bio 435, CHM 327, or consent of instructor. *Wu.*

BIO 540 Biogeography (3) W

Principles and concepts of the distribution of plants and animals throughout the world. Origins and dispersal of modern flora and fauna as related to environmental and historical factors. Lecture-discussion, 3 hours. Prerequisite: BIO 213 and BIO 325. *Szijj.*

BIO 542 Graduate Laboratory (1–3) FWSpSu

Advanced laboratory experience, individually arranged or concurrent with other graduate courses. May be repeated for a maximum of 10 units. Prerequisite: Consent of instructor. *Staff. (See note at bottom of page at the end of this section.)*

BIO 545 Physiology of Plant Disease (4) W 1985

Physiology of host-parasite relations, mechanisms of pathogenesis, and the bases for resistance and specificity in plant diseases, with special emphasis on diseases caused by fungi and bacteria. Lecture-discussion. 3 lectures, 1 three-hour laboratory. Prerequisites: BOT 223, BOT 422, CHM 227. *Staff.*

BIO 548 Advanced Plant Physiology (4) Sp 1985

Selected major aspects of plant water relations, metabolism, and growth. Emphasis on experimental investigations. Lecture-discussion, 2 hours, laboratory, 6 hours. Prerequisite: BOT 422. *Blakely.*

BIO 550 Plant Growth and Development (4) Sp 1984

Hormonal and environmental control of plant morphogenesis. Lecture-discussion, 2 hours, laboratory, 6 hours. Prerequisite: BOT 422. *Blakely.*

BIO 555 Molecular Biology of Development (3) Sp

Consideration of molecular mechanisms involved in differentiation as they relate to such phenomena as tissue specificity, gene control, morphogenesis, cell specialization, molecular/cellular evolutionary relationships. 3 lectures. Prerequisite: Consent of instructor. *Sperry, Troncale.*

BIO 560 Bacterial Physiology (4) Sp 1985

Physiological characteristics of bacteria with emphasis upon growth, biosynthetic capabilities and regulation of enzyme formation and function. Lecture-discussion, 3 hours, laboratory, 3 hours. Prerequisite: MIC 300 and CHM 327. *Goehler.*

BIO 565 Animal Tissue Culture (4) F

Principles, basic methodology, and special applications of animal cell culture. 2 lectures, 2 three-hour laboratories. Prerequisite: MIC 201 or similar experience in aseptic technique. *Pal.*

BIO 570 Cellular Immunity and Disease (4) Sp

T-cell mediated immunity, its protective and pathogenic roles; mechanisms of cellular immunity, its importance in infectious disease, transplant rejection, tumor surveillance, and autoimmune phenomena. Laboratory provides experience with lymphocyte tissue cultures, lymphocyte immune response *in vitro,* skin grafting, and passive cellular immunity. 3 lectures, 1 three-hour laboratory. Prerequisite: MIC 415. *Adler, McKane.*

BIO 575 Advanced Topics in Biology (2) FWSpSu

Discussion of advanced topics in biology. Topics selected to correspond with the changes in the field or needs of advanced students. Total credit limited to 6 units with a maximum of 2 units per quarter. Lecture-discussion, 2 hours. *Staff. (See note at bottom of page at the end of this section).*

BIO 576 Advanced Immunology (3) W 1985

Principles of immunoglobulin structure and the allotype and other isoantigenic concepts. Laboratory exercises in the fractionation and purification of serum globulins and in their use to study cytoantigens. Lecture-discussion, 2 hours, laboratory, 3 hours. Prerequisite: MIC 415. *Barlet.*

BIO 577 Transmission Electron Microscope Techniques (5) W

Skills and techniques in transmission electron microscopy, including specimen preparation, operation of the TEM and ancillary equipment, and darkroom techniques. Material of interest may be studied by the student. Lecture-discussion, 2 hours, laboratory, 9 hours by arrangement. Prerequisite: BIO 423 or consent of instructor. *Daniel.*

BIO 578 Scanning Electron Microscope Techniques (5) Sp

Skills and techniques in scanning electron miscroscopy, including specimen preparation, operation of the SEM and ancillary equipment, and darkroom techniques. Material of interest to the student may be studied. Lecture-discussion, 2 hours, laboratory, 9 hours by arrangement. Prerequisite: BIO 423 or consent of instructor. *Daniel.*

BIO 579 Recent Advances in Ultrastructure Research (3) W

Current developments in major fields of ultrastructure research. Lecture-discussion, 3 hours. Prerequisite: consent of instructor. *Daniel.*

BIO 590 Experimental Biology (3) FWSpSu

Lecture series concerning recent research in selected fields of biology; each series to have a subtitle identifying the field. Lecture-discussion, 3 hours. Total credit limited to 9 units. *Staff. (See note at bottom of page at the end of this section.)*

BIO 680 Seminar in Biology (1–3) FWSpSu

Arrangements to be made with faculty. Topics in disciplines of biology offered according to interests and needs of students. Each seminar to have a subtitle identifying the discipline. 1–3 units in one quarter, maximum of 9 units. *Staff.*

BIO 691 Directed Study (1–3) FWSpSu

Independent study in an area chosen by the student under the supervision and direction of a graduate faculty member. A maximum of 6 units may be taken. *Staff.*

BIO 692 Research in Biological Sciences (1–2) FWSpSu

Selection and completion of a research project under supervision of a graduate faculty member. Total credit limited to 6 units with a maximum of 3 units per quarter. Laboratory, 6 hours. *Staff.*

BIO 696 Thesis (1–3) FWSpSu

Compilation, evaluation, interpretation, and report of research for thesis. Completion of approved, bound thesis. Prerequisite: BIO 692. *Staff*

BIO 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. The student must be enrolled in the university during the quarter in which he/she graduates.

NOTE: The following are examples of the topics which have been offered previously under BIO 542, 575 and 590:

BIO 542

Advanced Ornithology Lab
Bioacoustics Lab
Fisheries Biology Lab
Mammalian Physiology Lab
Photobiology Lab
Plant Virology Lab
Systematic Entomology Lab
Wildlife Ecology Lab

BIO 575

Advanced Ornithology
Bioacoustics
Fisheries Biology
Pharmacology
Photobiology
Plant Virology
Systematic Entomology
Wildlife Ecology

BIO 590

Advances in Biological Control
Plant Speciation
Radiation Exposure

BUSINESS ADMINISTRATION

Master of Business Administration

In the School of Business Administration

Dr. Madeline Currie, *Director, Graduate Programs*

Graduate Programs Committee

Dr. Madeline Currie, *Chair*
Management and Human Resources

John K. Cheever
Accounting

Peter Dawson
Management and Human Resources

Ronald Eaves
Computer Information Systems

Patricia Hopkins
Marketing Management

Samuel Njuguna
Finance, Real Estate and Law

Charles E. Pinkus
Operations Management

The Master of Business Administration curriculum is designed to provide a two-year program of broad professional development. The objectives are to develop a better understanding of the role of the professional manager and the responsibilities within the firm and society; to assist the student in developing a critical approach to decision making and the ability to speak and write effectively and professionally; to develop skill in interpersonal relations; to develop a sound theoretical understanding of organizations and a management perspective for considering problems and making decisions from the viewpoint of the entire firm, industry, and economy; to develop an increased understanding and awareness of the world in which the individual lives; and to develop the capability of acquiring additional education alone. *GBA classes are not open to non-objective, post-baccalaureate (3100) students.*

Admission to the Program and Requirements

After a prospective student has submitted the application for admission to the MBA program to the Office of Admission, the procedure will be as follows:

1. Admission to the MBA program will be granted on recommendation of the School of Business Administration Graduate Programs Committee to the school dean. Selection will be on the basis of evidence of ability to perform at a high academic level. The following criteria are considered: the undergraduate grade-point average, scores on the Graduate Management Admissions Test, work experience, letters of recommendation, and the applicant's personal statement or interview.
2. A TOEFL score of 550 or better is required for admission of foreign students to the program.
3. The Dean of the School of Business Administration will notify applicants of their selection or rejection.
4. The Graduate Programs Director will serve as adviser to all selected applicants.
5. First-year program courses may be waived if equivalent courses have been successfully completed by the student. Waiver will be granted on recommendation of the Director and approval of the Graduate Programs Committee.
6. Transfer credits not exceeding thirteen quarter units completed in a graduate school of an accredited college or university may be accepted for second-year program courses upon recommendation of the Director and approval of the Graduate Programs Committee.
7. An advisory program study worksheet for the guidance of the student will be prepared by the Graduate Programs Director when the student is admitted to the MBA degree program. An official degree program will be finalized prior to the completion of the second quarter. It will be approved by the Graduate Programs Director and verified by the Dean of Graduate Studies.
8. A grade-point average of B (3.0) or better must be maintained in all course work taken to satisfy degree requirements and in all graduate-level course work taken at this university.
9. Students will be required to complete all 500-level courses before enrolling in 600-level courses.

Curriculum

First Year

		Units
GBA 510	Financial Accounting	4
GBA 511	Managerial Accounting	4
GBA 517	Marketing Strategy	4
GBA 519	Survey of Data Processing	4
GBA 530	Legal Environment of Business	4
GBA 531	Production and Operations Management	4
GBA 532	Managerial Statistics	4
GBA 535	Management Principles and Policies	4
GBA 546	Fundamentals of Financial Management	4
	Total, First Year	36

Second Year

Required Courses

EC 521	Business Economics	4
GBA 551	Accounting for Executive Administration	4
GBA 561	Seminar in Organizational Behavior	4
GBA 564	Management Science	4
GBA 643	Management Information Systems	4
GBA 646	Advanced Financial Management	4
GBA 652	Marketing Seminar	4
GBA 671	Management Seminar	4
	Sub-total	32

Elective Courses

Eight elective units may be selected from:

GBA 522	Information Systems Analysis and Design	4
GBA 524	Information Systems Implementation and Programming	4
GBA 560	Legal Environment of Information Systems	4
GBA 563	Executive Development	4
GBA 570	Entrepreneurship	4
GBA 577	Advanced EDP Auditing	4
GBA 578	Security and Privacy of Information Systems	4
HST 510	History of American Business	4
GBA 617	Industrial Dynamics	4
GBA 625	Support Systems Administration	4
GBA 626	Instructional Development for Business	4
GBA 627	Organizational Communications Project	4
GBA 633	Promotions Management	4
GBA 635	Motivation and Marketing Behavior	4
GBA 647	Security Analysis and Portfolio Management	4
GBA 649	Working Capital Management	4
GBA 659	Seminar in Current Accounting Theory	4
GBA 689	Financial Reporting and Communication	4
GBA 692	Independent study	4

With consent of the Graduate Programs Director up to 8 units of approved 400-level courses in business or economics may be selected as electives.

Required Electives

Eight elective units will be chosen from the following options:

GBA 691	Directed Study in Business, and	4
GBA 695	Business Research Project (or)	
GBA 696	Thesis	4
(OR)		
GBA 610	Management Policies and Strategies Practicum, and	4
GBA 627	Organizational Communications Project	4
	Total, Second Year	48

The Career MBA Program

The Career MBA Program is designed for those students who wish to specialize in a particular area of the curriculum. The set of courses selected as a concentration will be developed by the student and the appropriate department chair with the approval of the Graduate Director.

The program consists of 48 units of coursework that will insure competence in management, in technical skills, and in human relations. Forty units will be chosen from among present required and elective MBA courses. Eight units must be selected that meet the terminal requirement. The student's formal study program must be approved and on file in the graduate office before beginning the Career MBA Program.

CURRICULUM

First Year

		Units
GBA 510	Financial Accounting	4
GBA 511	Managerial Accounting	4
GBA 517	Marketing Strategy	4
GBA 519	Survey of Data Processing	4
GBA 530	Legal Environment of Business	4
GBA 531	Production and Operations Management	4
GBA 532	Managerial Statistics	4
GBA 535	Management Principles and Policies	4
GBA 546	Fundamentals of Financial Management	4
	Total, First Year	36

Second Year—Career MBA Program

Forty units may be selected from:

EC 521	Business Economics	4
GBA 522	Information Systems Analysis and Design	4
GBA 524	Information Systems Implementation and Programming	4
GBA 551	Accounting for Executive Administration	4
GBA 560	Legal Environment of Information Systems	4
GBA 561	Seminar in Organizational Behavior	4
GBA 563	Executive Development	4
GBA 564	Management Science	4
GBA 570	Entrepreneurship	4
GBA 577	Advanced EDP Auditing	4
GBA 578	Security and Privacy of Information Systems	4
GBA 591	Systems Approach	4
GBA 617	Industrial Dynamics	4
GBA 625	Support Systems Administration	4
GBA 626	Instructional Development for Business	4

GBA 627	Organizational Communications Project	4
GBA 633	Promotions Management	4
GBA 635	Motivation and Marketing Behavior	4
GBA 643	Management Information Systems	4
GBA 646	Advanced Financial Management	4
GBA 647	Security Analysis and Portfolio Management	4
GBA 649	Working Capital Management	4
GBA 652	Marketing Seminar	4
GBA 659	Seminar in Current Accounting Theory	4
GBA 671	Management Seminar	4
GBA 689	Financial Reporting and Communication	4
GBA 692	Independent Study	(1-4)
HST 510	History of American Business	4

With the approval of the Graduate Programs Director, up to 12 units may be selected from approved 400-, 500-, and 600-level courses such as business or economics.

Required Electives

Eight elective units will be chosen from the following options:

GBA 691	Directed Study in Business, and	4
GBA 695	Business Research Project	
or		
GBA 696	Thesis	4
or		
GBA 610	Management Policies and Strategies Practicum, and	4
GBA 627	Organizational Communications Project	4
	Total, Second year	48

Master of Science in Business Administration

In the School of Business Administration

The School of Business Administration offers a Master of Science in Business Administration for the student with a business degree who wishes to specialize in a concentrated area of coursework. The option in Business Education is intended primarily for individuals with an interest in teaching business subjects. The option in Electronic Data Processing Auditing is intended for students who wish to pursue a career in EDP Auditing.

ADMISSION TO THE PROGRAM

1. Admission to the MSBA program will be granted on recommendation of the School of Business Administration Graduate Programs Committee to the school dean. Selection will be on the basis of evidence of ability to perform at a high academic level. An applicant shall have a bachelor's degree in business or a related field from an accredited college or university. The following criteria are considered: the undergraduate grade-point average, scores on the Graduate Management Admissions Test, work experience, letters of recommendation, and the applicant's personal statement or interview.
2. A TOEFL score of 550 or better is required for admission of foreign students to the program.
3. The Dean of the School of Business Administration will notify applicants of their selection or rejection.
4. An advisory study worksheet will be prepared by the advisor for the program for the guidance of the student. During the second quarter of attendance and prior to the student's advancement to candidacy, an official degree program will be prepared. It will be approved by the Director of Graduate Programs and verified by the Dean of Graduate Studies.

REQUIREMENTS

1. The degree program must include a minimum of 45 quarter units. Transfer credits not exceeding thirteen quarter units completed in a graduate school of an accredited college or university may be accepted upon approval of the Graduate Programs Director.
2. A grade-point average of B (3.0) or better must be maintained in all course work taken to satisfy degree requirements and in all graduate-level course work taken at this University.
3. The candidate must fulfill the terminal requirement of a research project, thesis, or comprehensive examination.

MASTER OF SCIENCE IN BUSINESS ADMINISTRATION (Option in Business Education)

The MSBA in Business Education is intended primarily for individuals with an interest in teaching business subjects in secondary schools, community collleges, or four-year colleges. The objectives of the program are:

- To develop an understanding of the role and scope of business education and its relationship to the total educational program;
- To develop the ability to read, interpret, and conduct research in business education;
- To prepare students for secondary, community college, and college positions as professional classroom teachers, supervisors of instruction, and department heads;
- To prepare students to teach in or supervise a business education program in a business college, an adult education school, or in the training department of a business firm; and
- To provide the necessary background for doctoral study and for continued, self-directed study.

CURRICULUM

The program of study for the MSBA in Business Education will consist of 24 required units and 21 approved elective units.

REQUIRED COURSES

GBA 540	Foundations of Business Education	4
GBA 541	Review of Research in Business Education	4
GBA 550	Seminar in Business Education	4
GBA 625	Support Systems Administration	4
GBA 626	Instructional Development for Business	4
GBA 627	Organizational Communications Project	4
	Sub-total	24

ELECTIVE COURSES

With the approval of the Graduate Programs Director, up to 17 units may be selected from approved 400-, 500-, and 600-level courses in business, economics, or teacher preparation.

DIRECTED ELECTIVES

As a terminal requirement, four elective units will be chosen from among the following options:

GBA 691	Directed Study (and) Comprehensive Examination (0 units)	4
GBA 695	Business Research Project	4
GBA 696	Thesis	4
	TOTAL	45

MASTER OF SCIENCE IN BUSINESS ADMINISTRATION (Option in EDP Auditing)

The MSBA in Electronic Data Processing Auditing is intended primarily for individuals with an interest in pursuing a career in EDP auditing. Also, the program is for business decision-makers, information systems technical specialists, information systems managers, and professionals in accounting, EDP auditing, and other disciplines who wish to develop a better awareness of this field and how it can assist their organization. The objectives of the program are to develop the ability to plan and conduct audits of the EDP function, to develop the capability of reporting to management the findings reached, to prepare students for careers in the EDP Auditing profession; and to provide the necessary background for doctoral study and continued, self-directed study.

CURRICULUM

Due to the technical orientation of the EDP Auditing Option, a strong background in accounting and information systems is required. Before a student can be advanced to candidacy, deficiencies in any of the subject matter listed below must be removed.

REQUIREMENTS FOR ADMISSION TO THE PROGRAM

ACC 301	Intermediate Accounting	4
ACCT 419	Auditing Principles	4
CIS 433	EDP Auditing	4
GBA 522	Systems Analysis and Design	4
GBA 524	Systems Implementation and Programming	4
	Total	20

The program of study for the MSBA in EDP Auditing will consist of 28 required units and 17 approved elective units.

REQUIRED COURSES

GBA 560	Legal Environment of Information Systems	4
GBA 561	Seminar in Organizational Behavior	4
GBA 564	Advanced Managment Science	4
GBA 577	Advanced EDP Auditing	4
GBA 578	Security and Privacy of Information Systems	4
GBA 643	Management Information Systems	4
GBA 695	Business Research Project (or)	
GBA 696	Thesis	4
	Sub-total	28

ELECTIVE COURSES

With the approval of the EDP advisor and Graduate Programs Director, a minimum of 13 units are to be seleced from the following list.

ACC 414	Cost Accounting and Budgeting	4
ACC 415	Advanced Costing Techniques	4
ACC 420	Advanced Auditing	4
CIS 434	Comparative Language	4
CIS 435	Advanced Systems Design	4
CIS 457	Distributed Systems	4
CIS 458	Data Processing Management	4
EC 521	Business Economics	4
GBA 692	Independent Study	1–4
	Total	45

Graduate Course Descriptions

GBA 510 Financial Accounting (4)

Accounting principles used in the collection, interpretation, and use of financial data from the standpoints of creditors, investors, and management. Lecture-discussion, 4 hours.

GBA 511 Managerial Accounting (4)

Principles of financial analysis, costing concepts, the interpretation of costed data, and decision making. Lecture-discussion, 4 hours. Prerequisite: GBA 510.

GBA 517 Marketing Strategy (4)

Development of marketing strategy to identify, sense, serve, and satisfy an organization's specific markets and publics. Concepts relating to the analysis, planning, implementation, and control of marketing programs. Lecture-discussion, 4 hours.

GBA 519 Survey of Data Processing (4)

Examination of data processing vocabulary, concepts, and devices. Introduction to computer programming in batch and time-sharing modes using the FORTRAN language. Tools and techniques of systems analysis. Lecture-discussion, 4 hours.

GBA 522 Systems Analysis and Design (4)

Application of structured systems analysis and design techniques to computer information systems development. Case studies using data flow diagrams, data dictionary, structure charts, normalization, and a review of alternative design strategies. Prerequisites: GBA 519.

GBA 524 Systems Implementation and Programming (4)

Programming of computer information systems using structured COBOL language. COBOL language, file processing, sequential, random and indexed file structures, and introduction to data base management systems software. Programming case projects. Prerequisites: GBA 522.

GBA 530 Legal Environment of Business (4)

Analysis of the essential legal aspects of the business environment dealing with contracts, business-related torts, agency, employment law, and corporations. Function and operation of the courts and administrative agencies. Risk analysis and preventative law approach. Lecture-discussion, 4 hours.

GBA 531 Production and Operations Management (4)

Introduction to fundamental concepts of industrial management. Allocating existing resources, product quality, manpower requirements, industrial scheduling and control, budgeting and investment analysis of equipment selection and replacement. Lecture-discussions, 4 hours. Prerequisite: GBA 532.

GBA 532 Managerial Statistics (4)

Decision making using classical techniques, non-parameter tests, Bayesian analysis, utility theory, index numbers, and time-series analysis. Sampling and sampling distributions, estimation, hypothesis testing, variance analysis, regression, correlation and multiple regression. Lecture-discussion, 4 hours.

GBA 535 Organizational Management, Principles and Behavior (4)

Integration of management functions and behavioral processes as they relate to the operation of total enterprise. Lecture-discussion, case studies, experiential exercises, 4 hours.

GBA 540 Foundations of Business Education (4)

Principles, philosophy, and history of business education. Principles of curriculum development and evaluation; the role and scope of business education and its relationship to the total educational program. Lecture-discussion, 4 hours.

GBA 541 Review of Research in Business Education (4)

Criteria for the evaluation of research in business education. Survey of methods employed in research; review and evaluation of reported research; areas of needed research. Development of a research proposal. Lecture-discussion, 4 hours. Prerequisite: GBA 540.

GBA 542 Problems in Business Education (4)

Departmental and classroom problems related to curricula, equipment, guidance, community relations, governmental regulation of programs, and personnel. Lecture-discussion, 4 hours.

GBA 543 Innovations and Trends in Business Education (4)

Study of current trends and innovations in business education on the secondary and collegiate levels. Seminar discussions, demonstrations, observations. Seminar 4 hours. May be taken in two of the following fields:

a. Bookkeeping and Accounting
b. Business-Economics Education
c. Data Processing for Teachers
d. Distributive Education
e. Office-Secretarial Subjects

GBA 546 Fundamentals of Financial Management (4)

Theoretical and conceptual framework for financial decision making stressing analytical and quantitative techniques. Analysis of controversial and sophisticated methods of allocating resources and raising funds both internally and externally within the corporate context. Lecture-discussion, 4 hours. Prerequisite: GBA 510.

GBA 550 Seminar in Business Education (4)

Discussion of selected areas in business education. Seminar, 4 hours. Prerequisite: GBA 540 or consent of instructor.

GBA 551 Accounting for Executive Administration (4)

Control systems, responsibility in profit planning and control, capital investment decisions, and federal income tax aspects of decisions. Lecture-discussion. 4 hours. Prerequisite: GBA 511.

GBA 560 Legal Environment of Information Systems (4)

Fundamentals and intermediate knowledge of the legal environment concerning EDP. Typical legal problems arising from the acquisition, use and control of EDP. 4 lectures. Prerequisites: CIS 433 and GBA 530.

GBA 561 Seminar in Organizational Behavior (4)

Human processes employed in accomplishing work tasks and creating employee satisfaction within the organization. Group experiences whereby students test their interpersonal skills in the organizational environment. Group activities, lecture discussion, 4 hours.

GBA 563 Executive Development (4)

Analysis of the factors endemic to the successful executive and how these skills and traits can be acquired. Seminar, 4 hours. Prerequisite: GBA 561.

GBA 564 Management Science (4)

Quantitative theory and techniques. Linear, integer, non-linear, and dynamic programming, transportation and assignment algorithms, replacement problems, game theory and Markov processes; introduction to computer solutions. Lecture-discussion 4 hours. To be taken during first quarter of the second year of the MBA program. Prerequisite: GBA 534.

GBA 570 Entrepreneurship (4)

A study of entrepreneurship as it relates to the founding of new companies, leveraged buyouts, divisional spinoffs, and growth from small to medium size sales volume. Examines managerial strategies and creative corporate structuring that taps the entrepreneurial spirit. Lecture-discussion, 4 hours.

GBA 577 Advanced EDP Auditing (4)

Hands on experience in applying EDP Auditing techniques and methods. Fundamentals of advanced concepts in EDP Auditing. 4 lectures and projects. Prerequisites: CIS 433 or equivalent experience.

GBA 578 Security and Privacy of Information Systems (4)

Practical case-study approach to solving security problems peculiar to the commercial data systems environment. 4 lectures. Prerequisite: CIS 433.

GBA 599 Special Topics for Graduate Students (4)

Lecture-discussion of selected topics comprising new or experimental courses not otherwise offered. Each offering identified in the current schedule and on the student's transcript. Prerequisite: Consent of instructor.

GBA 610 Management Policies and Strategies Practicum (4)

Experience in the making of business policy and developing competitive strategies at the top management level. Computer-based simulation, 4-hours. This course, when combined with GBA 627 Organizational Communication, may be substituted for courses GBA 691 Directed Study in Business and GBA 695 Business Research Project (or GBA 696 Thesis) in the MBA core curriculum.

GBA 617 Industrial Dynamics (4)

Interaction of supervisors and employees within the social system of the plant. Resolutions of problems and tensions through communication. First-line supervisor as a member of management. The union, collective bargaining, and arbitration. Labor legislation. Cultural differences as they affect group dynamics. Lecture-discussion, 4 hours.

GBA 625 Support Systems Administration (4)

Support activities and services provided by management support personnel including: support systems organization and management; records systems; procedures analysis, simplification and improvement; support personnel selection, utilization and management; employee productivity assessment; communications and forms management, offices planning and environment; work station and equipment considerations. Lecture-discussion, 4 hours.

GBA 626 Instructional Development for Business

The development of instructional strategies for business education and training programs. Appraisal of innovative educational programs. Examination of career paths in higher education for business. Seminar (4 hours).

GBA 627 Organizational Communications Project (4)

Developing communication skills in the transmission and reception of information, written and oral; becoming familiar with the organizational literature; practicing communication skills in small groups; reviewing writing practices and procedures and the approved style manual written research project. Lecture-discussion, 4 hours.

This course, when combined with GBA 610 Management Policies and Strategies Practicum, may be substituted for courses GBA 691 Directed Study in Business and GBA 695 Business Research Project (or GBA 696 Thesis) in the MBA core curriculum.

GBA 633 Promotion Management (4)

Managerial aspects of promotion linking the enterprise to target markets. Explication of strategic relationships among advertising, personal selling, public relations, publicity, and sales promotion. Planning of promotional campaigns as part of overall marketing strategy. Lecture-discussion, 4 hours. Prerequisite: GBA 517.

GBA 635 Motivation and Market Behavior (4)

Theory and application of the findings of the behavioral sciences to the ultimate consumer in a relatively affluent society to give the decision maker effective bases for making and implementing product, price, promotion, distribution and public policy. Lecture-discussion, 4 hours. Prerequisite: GBA 517.

GBA 643 Management Information Systems (4)

Analysis of the problems involved in the design of automated systems to provide managers with the accurate, timely, and adequate information required for decision making. Lecture-discussion, 4 hours. Prerequisite: GBA 519.

GBA 646 Advanced Financial Management (4)

Fundamental issues of financial management; short-term asset management; evaluation of long-term assets, capital structure models, and sources of capital. Lecture-discussion, 4 hours. Prerequisites: GBA 564 and EC 521.

GBA 647 Security Analysis and Portfolio Management (4)

The three major types of investment analysis: fundamental, technical and random walk, with emphasis on the fundamental approach to valuation and stock selection. Portfolio analysis, composition, selection, revision and performance. Two-parameter, risk and return models, such as the capital asset pricing model and the capital market line. Seminar, 4 hours. Prerequisite: GBA 546.

GBA 649 Working Capital Management (4)

Discussion and evaluation of techniques for managing inventory, accounts receivable and liquid reserves. Analyses of short-term planning models using linear programming. Prerequisites: GBA 534 and 546.

GBA 652 Marketing Seminar (4)

Marketing decision making. Application of marketing concepts and implementation of effective marketing programs. Analysis of marketing decision-making techniques. Present and future marketing trends. Lecture-discussion, 4 hours. Prerequisite: GBA 517.

GBA 659 Seminar in Current Accounting Theory (4)

Evolution of accounting theory. Current problems, reasons, and causes for controversy, and future developments. Seminar, 4 hours. Prerequisite: GBA 551.

GBA 671 Management Seminar (4)

The development and evaluation of alternative corporate strategies, drawing upon the functional areas within business and the outside environmental factors which affect business. Seminar, 4 hours. Prerequisite: GBA 561.

GBA 689 Financial Reporting and Communication (4)

Application of selected theory concepts in model construction. The determination of changes in reported operating results arising from changes in accounting theory. Seminar, 4 hours. Prerequisite: GBA 564.

GBA 691 Directed Study in Business (1-4)

Independent, directed study of advanced topics in the field. Individual conferences with the instructor.

GBA 692 Independent Study (1-4)

Individual investigation or original study to be conducted in a field of interest selected by the student with approval of the instructor. Intensive personal research under initiative of the student with general guidance and advice from the instructor. Seminar.

GBA 695 Business Research Project (4)

A written research project concerning a significant problem in the field of business. Prerequisite: GBA 691 for MBA candidates. GBA 541 for MS candidates in Business Education.

GBA 696 Thesis (4)

A formal thesis concerning a significant problem in the field of business. Prerequisite: GBA 691 for MBA candidates. GBA 541 for MS candidates in Business Education.

GBA 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. The student must be enrolled in the university during the quarter in which he/she graduates.

CHEMISTRY

Master of Science in Chemistry

In the Department of Chemistry, School of Science

Victor P. Abegg, *Chair*

Graduate Program Committee

Yu-Ping Hsia, *Chair*

Scott E. Pattison

Earl L. Pye

The Master of Science degree in Chemistry provides a comprehensive understanding of the principles of chemistry and application in detail to advanced problems. This understanding will be gained through course work, seminar, independent study, and research. The program is designed to provide the student with the necessary skills and techniques to reach the applicant's particular objective, whether it be for a successful career in teaching or industry or to pursue further graduate work. The student in this program may pursue one of several fields of specialization which include analytical, inorganic, organic, physical chemistry, and biochemistry.

Admission to the Program

An applicant for admission to the graduate program in chemistry must have received a baccalaureate degree in chemistry or in a related discipline, including at least 36 quarter units of chemistry courses. An applicant lacking these qualifications may be admitted subject to a review of the candidate's academic background by the departmental graduate program committee. Admission to the program requires an undergraduate grade point average of 2.5 and an average of 3.0 in chemistry courses. A limited number of students not meeting these requirements may be admitted on a conditional basis if facilities permit. Such students must meet requirements stipulated in the statement of conditional admission within the time limit specified, to remain in the university.

Each selected applicant, with an advisory committee, will design a program in the selected area of specialization based upon interests, preparation, and performance on a departmental placement examination. The program will include required courses, selection of courses in an area of specialization, independent study, and a thesis. It will normally constitute 45 to 50 quarter units of credit.

Requirements

1. The degree program must include a minimum of 45 quarter units, including no more than 13 acceptable units transferred from another graduate institution. No more than 21 units may be in approved 400-level courses.
2. The student must complete his program based upon the curriculum outlined below.
3. The student must demonstrate a reading knowledge of a modern foreign language or proficiency in a computer programming language acceptable to the chemistry department.
4. An acceptable thesis must be completed and the necessary copies submitted in accordance with university regulations.
5. An examination in defense of the thesis must be successfully completed.

Curriculum

Required Courses

		Units
CHM 550	Seminar in Chemistry (Student must enroll for 1 unit of seminar during 3 separate quarters)	3
CHM 696	Research and Thesis	9
Courses in an area of Specialization		8

Select 6 units in a 2-quarter sequence in an area of specialization, to be selected from CHM 522, 523 (theoretical); CHM 541, 542 (organic); CHM 553, 554 (physical); CHM 561, 562 (biochemistry); CHM 571, 572 (inorganic); or CHM 581, 582 (analytical). Each of these courses requires a concurrent enrollment in 1 unit of CHM 513, Independent Study.

Approved electives	25
Total minimum	45

Graduate Course Descriptions

The notations F, W, Sp, Su and even or odd indicate which quarter(s) of even or odd numbered calendar years the course is normally offered. Courses not designated "even" or "odd" are offered each year.

CHM 513 Independent Study in Advanced Chemistry (1) F, W, Sp

Reading and reports on papers in the literature, solving of assigned problems. Minimum of 60 hours total time. Concurrent: any of CHM 522, 523, 541, 542, 553, 554, 561, 562, 571, 572, 581, 582. May be repeated for a maximum of 7 units.

CHM 522, 523 Applied Quantum Chemistry (3) (3) W, Sp, odd years, respectively

Application of quantum chemistry to problems of atomic and molecular structure; molecular orbital and valence bond theories. Theory of transition moments and application to IR, UV, RAMAN and spin resonance Spectroscopy, Lecture-discussion, 3 hours. Prerequisite: CHM 419 or consent of instructor. Concurrent: CHM 513.

CHM 541, 542 Advances in Organic Chemistry (3) (3) F, even years; W, odd years, respectively

Modern synthetic organic chemistry with emphasis on reactions, reaction mechanisms, structure, structure determination, and sterochemistry of organic compounds. Selected topics from organic photochemical reactions and chemistry of organometallic, heterocyclic, organophosphorus, and organoboron compounds. Lecture-discussion, 3 hours. Concurrent: CHM 513.

CHM 543 Chemistry of Heterocyclic Compounds (3) W, even years

Chemistry of organic compounds, having three, four, five, and six membered cyclic structure and containing one or more than one hereroatom. Lecture-discussion, 3 hours.

CHM 544 Chemistry of Natural Products (3) Sp, even years

Isolation, structure elucidation and synthesis of naturally occurring compounds like alkaloids, carbohydrates, hormones, peptides, steroids, and terpenes. Lecture-discussion, 3 hours.

CHM 545 Organic Photochemistry (3) F, odd years

Light-induced chemical reactions of organic compounds. The mechanism of photochemical reactions and applications to synthesis problems encountered in organic chemistry. Lecture-discussion, 3 hours.

CHM 546 Physical Organic Chemistry (3) Sp, odd years

The application of physico-chemical principles to organic chemistry, with emphasis on the kinetic approach. Mechanisms of organic reactions will be studied in depth and the experimental evidence will be critically examined. 3 lectures.

CHM 550 Seminar in Chemistry (1) F, W, Sp

Special problems in selected areas of chemistry. Seminar, 1 hour. May be repeated for a maximum of 3 units.

CHM 553, 554 Advanced Physical Chemistry (3) (3) F, odd years; W, even years, respectively

Selected topics from advanced physical chemistry such as statistical mechanics, kinetics and solution chemistry. Lecture-discussion, 3 hours. Concurrent: CHM 513.

CHM 561, 562 Selected Topics in Biochemistry (3) (3) W, Sp respectively

Basic chemical principles as applied to topics of biochemical interest, for example, cellular energetics and kinetics, analysis of the structure and function of proteins and other supermolecules, feedback control of metabolism, biochemical behavior of organelles. Lecture-discussion, 3 hours. Each course may be repeated once for credit. Concurrent: CHM 513.

CHM 565 Biochemical Mechanisms (3) F, odd years

General mechanistic principles of organic and inorganic chemistry as they relate to biochemistry. Lecture-discussion, 3 hours.

CHM 567 Advanced Clinical Chemistry (3) Sp, odd years

Chemical basis of recent advances in analytical methods and techniques, basis of new instrumentation, treatment of data, interpretations of clinical analyses. Lecture-discussion, 3 hours.

CHM 571, 572 Advanced Inorganic Chemistry (3) (3) W, Sp, even years, respectively

Chemical applications of group theory; bonding theories and their applications to the properties of inorganic compounds; inorganic reaction mechanisms; physical methods in inorganic chemistry. Lecture-discussion, 3 hours. Concurrent: CHM 513.

CHM 581, 582 Advances in Analytical Chemistry (3) (3) W, Sp, odd years, respectively

Selected topics in modern analytical chemistry. Lecture-discussion, 3 hours. Concurrent: CHM 513.

CHM 691 Directed Study (1-3) F, W, Sp, Su

Independent study in an area chosen by the student under the supervision and direction of a graduate faculty member.

CHM 696 Thesis (1-3) F, W, Sp, Su

Compilation, evaluation, interpretation, and report of research for thesis. Completion of approved, bound thesis.

CHM 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. The student must be enrolled in the university during the quarter in which he/she graduates.

COMPUTER SCIENCE

Master of Science in Computer Science

In the Department of Computer Science, School of Science

Bruce P. Hillam, *Chair*

Hsun K. Liu, *Coordinator, Graduate Program*

The graduate program in Computer Science will provide an opportunity to deepen the student's understanding of the principal hardware and software themes and develop his ability to analyze and formulate solutions for a number of problems which occur in computer systems. The measure of the student's success in the graduate program will be met not only in terms of technical competence but also by the increase in confidence in the student's ability for independent work and independent judgement.

Admission to the Program

For admission as a classified graduate student the applicant should have completed, with a "B" average or better, coursework equivalent to the following:

a. CS 365 Computer Organization
b. CS 420 Artificial Intelligence
c. CS 431 Operating Systems
d. CS 441 Translators
e. MAT 208 Linear Algebra
f. MAT 215 Calculus of Several Variables
g. STA 330 Applied Probability

Applicants with a deficiency in any of these areas may be admitted with conditional standing and must satisfactorily complete a prescribed set of courses before becoming eligible for classified graduate standing.

Beginning Fall 1983 all students will be required to take the Graduate Record Exam (GRE) advanced test in Computer Science. In addition, foreign students are reqquired to take the TOEFL exam and pass with a score of 550 or above.

All graduate students must meet with their graduate advisor or committee and prepare a study list which will define all courses and other requirementsto be completed for the degree.

Requirements

You are urged to know the general scholastic requirements described in the early pages of the Graduate Studies section of the catalog.

In addition to the general requirements, at least 21 of the 45 units must be completed after you reach classified graduate standing. The graduate seminar, directed study, and project courses are open only to students with classified graduate standing.

Curriculum

Required Courses

		Units
CS 520	Intelligent Systems	4
CS 525	Advanced Computer Organization	4
CS 530	Computer Science Theory	4
CS 540	Software Systems	4
CS 564	Graduate Seminar	2
CS 691	Directed Study	3
CS 696	Thesis	4
* *OR*	Comprehensive Exam	0
Electives		
Two of the following courses		
CS 541	Advanced Software Systems	8
CS 545	Computer Graphics	
CS 565	Computer Networking and Distributed Computing	
Approved upper division or graduate level offerings		12
Total		45

* Students electing this option will include 4 additional units of electives in their programs.

Graduate Course Descriptions

CS 520 Intelligent Systems (4)

Artificial intelligence, computer vision, pattern recognition and image processing, knowledge-based systems, robotics, picturial databases. 4 lecture-discussions. Prerequisite: CS 420 or consent of instructor.

CS 525 Advanced Computer Organization (4)

Syntax and application of a computer description language (CDL). Processor specification using a CDL Multiprocessor, distributed and parallel processing systems organization. Case studies. 4 lecture-discussions. Prerequisite: CS 365 or consent of instructor.

CS 530 Theory of Computability (4)

Recursive function theory, effective procedures, Turing machines, Markov algorithms, Post systems, decidability and completeness. Complexity theory: compressions and speedup, complexity measures, polynomial time and space, NP-complete problems. 4 lecture-discussions.

CS 540 Software Systems (4)

Methodology and requirements, programming style and requirements, specification techniques, error recovery and optimization. 4 lecture-discussions. Prerequisites: CS 408, 431, 441.

CS 541 Advanced Software Systems (4)

Testing, validation and reliability; test design, test execution, test evaluation and proof of correctness; case study. 4 lecture-discussions.

CS 545 Computer Graphics (4)

Introduction to computer graphics, display processor, data structures, picture structure and picture transformations, interpolation and approximation of curves and surfaces, rendering of surfaces and solids, language concepts for interactive computer graphics. 4 lecture-discussions.

CS 564 Graduate Seminar (2)

Topics chosen according to the interests and needs of the students. Each seminar will have a subtitle reflecting the content of the course. Open only to classified graduate students. May be repeated for a maximum of 4 units.

CS 565 Computer Networking and Distributed Computing (4)

Modeling and quantitative approaches to computer networks, teleprocessing, and distributive computing. Statistical multiplexing and packet switching, buffering, front-end processing, network structures, and distribution of control hardware, data, and software. 4 lecture-discussions. Prerequisite: CS 405

CS 691 Directed Study (1-3)

Individual study program in an area chosen by the student under the direction and supervision of the faculty. Open only to classified students and with approval of the graduate advisor. Maximum of 3 units.

CS 696 Thesis (4)

Independent research and study under supervision of the faculty. Reporting of research results in an acceptable form. Open only to classified graduate students and with approval of the graduate advisor.

CS 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. The student must be enrolled in the university during the quarter in which he/she graduates.

CREDENTIAL PROGRAMS

In the Teacher Preparation Center

David M. Greene, *Director*

George M. Platner, *Associate Director*

Gary M. Garfield, *Coordinator, Multiple Subjects Credential Program*

Richard C. Jacobs, *Coordinator, Single Subjects Credential Program*

Rodman F. Garrity, *Associate Coordinator, Special Education Specialist Credentials*

Cecilia Cota-Robles Juarez, *Associate Coordinator, Bilingual Cross-Cultural Specialist Credential (Chicano)*

Virginia Johnson, *Associate Coordinator, Reading Specialist Credential*

California education specialist credentials are also a part of the university's curricula. Post-baccalaureate students admitted to a program leading to university recommendation for a teaching credential are accorded classified status parallel to that of master's degree candidates, or the master's degree may be pursued in conjunction with a specialist credential, in such case the M.A. classification will be designated.

The university is approved by the State Commission for Teacher Preparation and Licensing to recommend qualified students for the Single Subject Teaching Credential, the Multiple Subject Teaching Credential, the Reading Specialist Credential, the Bilingual/Cross-Cultural Specialist Credential (Chicano), the Special Education Specialist Credential (Learning Handicapped and Severely Handicapped), the Resource Specialist Certificate of Competence, and the Agriculture Specialist Credential.

Information on admission and course requirements for these credentials is available from the Director of the Teacher Preparation Center and from the Associate Coordinators of the various credential programs.

Teacher Preparation Center

Teacher preparation is a university-wide function. The Teacher Preparation Center serves as the university-wide planning and coordinating office for all teaching credential programs. Faculty members from most schools have a role in meeting teacher preparation objectives. The members of the university-wide Teacher Education Advisory Committee represent the departments offering credential majors.

Credential Majors

The prospective Multiple Subjects (elementary) or Single Subject (secondary) teacher candidates must choose a major from the following:

Multiple Subject Candidates:
Liberal Studies

Students with majors other than
Liberal Studies must pass the National Teacher's Examination and/or the Liberal Studies waiver program.

*Single Subject Candidates:
Agriculture, Art, Biological Sciences, Business, Chemistry, English, History, Home Economics, Mathematics, Music, Physical Education, Physics, Political Science, Social Science.

* Students with majors in journalism, speech, and drama may be credentialed after completing specified requirements in the Department of English and Modern Languages.

Admission to Candidacy

Admission to the university is not equivalent to being accepted into a teacher preparation program. A candidate for a teaching credential is selected through a three-step process involving university-wide teacher education committees which cooperate with the Teacher Preparation Center in reviewing the qualifications of the candidate and recommending regarding admission to the program. One may apply for the program after enrolling in TEP 391, Foundations of Teaching.

A candidate for a teaching credential must be granted approval by the appropriate teacher education committees to enter the teacher preparation program, to participate in student teaching, and to receive a recommendation for the credential. Detailed information is available at the Teacher Preparation Center. Information regarding the requirements for specialist credentials is available from the appropriate coordinator/adviser in the Teacher Preparation Center.

ECONOMICS

Master of Science in Economics

In the Department of Economics, School of Arts

John T. Shieh, *Chair*

Franklin Ho, *Graduate Coordinator*

The purposes of the program leading to a Master of Science in Economics are (1) the preparation of economists qualified for immediate employment by business and government; (2) the preparation of economists for research positions in fields such as public administration, labor organization, finance, insurance and marketing; (3) the preparation of teachers of economics at the secondary school and community college level; (4) the enhancing of the competence of those students who wish to pursue advanced graduate work in economics. Graduate study specialization may be elected in any of the following areas: managerial economics and operations research; economic planning and development; quantitative economics; international economics; money and capital markets; industrial organization and public policy; urban and regional economics.

Admission to the Program

An applicant for admission to this program must hold a bachelor's degree from an accredited college or university and satisfy university and departmental requirements for admission to graduate study. An applicant who holds a bachelor's degree in a field other than economics or who does not meet admission criteria may apply for admission as a conditional graduate student. The conditions will be stated in writing at the time of admission and will specify the amount of time allowed to meet entrance conditions. In undergraduate work, the applicant must have maintained a grade point average of 3.0 or better in economics courses and a grade point average of 2.7 overall. All applicants for admission to the program are required to take the Graduate Record Examination Aptitude Test and the Advanced Economics Test. Admission to the graduate program in economics requires that the applicant be accepted by the Department of Economics.

Requirements

A minimum of 45 quarter units is required for the Master of Science degree in economics. Each student must take 16 units of required core courses and fulfill the terminal requirement of either a thesis, or a comprehensive examination. Each student shall indicate in writing, prior to advancement to candidacy, the decision as to the manner of fulfiling the terminal requirement. Courses for the balance of the 45 quarter units are selected by the individual student in the area of interest or specialization with the advice and consent of appropriate faculty adviser(s).

No more than 13 quarter units of acceptable credit may be transferred from another graduate institution. A maximum of 16 units may be taken in approved upper-division courses.

Curriculum

	Units
Required Courses	16
EC 550 Microeconomic Analysis	4
EC 551 Macroeconomic Analysis	4
EC 552, 553 Econometrics	4,4
Field of Specialization	8
Electives	12-21
Terminal Requirement	0-9
Thesis (9 maximum)	
*Comprehensive examination	0
Total	45

* Students electing this option will include 9 additional units of electives in their programs.

Graduate Course Descriptions

EC 521 Business Economics (4)

The role of business firms in the resources allocation process. The behavior and decision-making process of firms in a variety of market structures. New approaches in the theory of the firm. Seminar, 4 hours. Prerequisite: Graduate standing and an elementary knowledge of economics.

EC 540 Seminar in Economics (1-3)

Special problems in selected areas of economics. Each seminar will be structured to meet the needs of individual students. Seminar, 1 to 3 hours.

EC 550 Microeconomic Analysis (4)

Analysis of the resources allocation systems and behavior of producing and consuming units. Lecture-discussion, 4 hours. Prerequisite: Some knowledge of elementary calculus and linear algebra; intermediate price theory (equivalent to EC 311, EC 312, and EC 401); or consent of instructor.

EC 551 Macroeconomic Analysis (4)

Analysis of aggregate national economic activities. Lecture-discussion, 4 hours. Prerequisite: Some knowledge of elementary calculus and linear algebra; intermediate income theory (equivalent to EC 313); or consent of instructor.

EC 552, 553 Econometrics (4) (4)

Specification and statistical inference in econometric models; estimation, verification and prediction of economic variables; recent empirical studies, advanced topics in econometrics. Lecture-discussion, 4 hours. Prerequisite: Calculus and matrix algebra; intermediate price and income analysis; one year of statistics; or equivalent; or consent of instructor.

EC 560, 561 Managerial Economics and Operations Analysis (4) (4)

Advanced topics and new developments in managerial economics and operations research. Lecture-discussion, 4 hours. Prerequisite: Intermediate microeconomics, mathematical analysis (equivalent to MAT 108, 109, 204); and statistics (equivalent to EC 321, 322); or consent of instructor.

EC 654 Economics of International Finance (4)

Advanced topics in international liquidity and finance theory. Problems of international monetary system. Balance of payments theory and practices; theory of exchange rates and mechanism of international adjustment. Lecture-discussion, 4 hours. Prerequisite: Intermediate price and income theory; undergraduate money and banking; undergraduate international finance, or consent of instructor.

EC 655 Economics of International Trade (4)

Advanced topics in international trade. Theory of exchange; tariffs and other trade barriers. Problems of international competition and cooperation. Lecture-discussion, 4 hours. Prerequisite: Intermediate price and income theory; undergraduate international trade theory and policy, or consent of instructor.

EC 656, 657 Money and Capital Markets (4) (4)

Topics in monetary and capital theory. Liquidity creation, financial intermediation and capital formation. Development of capital policy. Lecture-discussion, 4 hours. Prerequisite: Intermediate price and income theory and undergraduate money and banking.

EC 658 Industrial Organization and Public Policy (4)

The organization and structure of the American enterprise economy with special reference to manufacturing and processing industries. Corporate behavior, price policy and workability of competition in industries. Public policy towards monopoly and competition. Lecture-discussion, 4 hours. Prerequisite: EC 311 and 312 or consent of instructor.

EC 659 Public Utilities and Transportation (4)

Economics of the public service corporation; economic problems of regulation; state and national problems arising from development of transportation and public utilities; pricing and resource allocation and policy problems. Prerequisite: EC 311, 312 or consent of instructor.

EC 660 Public Finance (4)

Government taxation and expenditure. The fiscal decision process and fiscal choice theory. Government budgeting and cost benefit analysis. Lecture-discussion, 4 hours. Prerequisite: Graduate standing and consent of instructor.

EC 665 Economic Development (4)

Advanced topics in economic development. Historical analysis of causes and consequences of economic development. Special attention to the problems of developing and underdeveloped nations. Lecture-discussion, 4 hours. Prerequisite: Undergraduate economic development or equivalent or consent of instructor.

EC 666 Economic Planning (4)

Critical review of goals, means, theories, and practices of economic planning. Central planning and decentralized planning. Conceptual and methodological differences in advanced economy and underdeveloped economy. Lecture-discussion, 4 hours. Prerequisite: Undergraduate economic development or equivalent or consent of instructor.

EC 667 Urban Economic Problems (4)

Economic analysis as applied to current and future urban problems and public policy. Demand and supply of urban public services. Problems of urban housing, transportation, and employment. Analysis of urban spatial distribution of economic activities. Lecture-discussion, 4 hours. Prerequisite: Undergraduate urban and regional economics or consent of instructor.

EC 668 Regional Economics (4)

Advanced theories and techniques of regional economic analysis. Distribution of resources among regions; regional competition and economic interdependence. Determinants of regional growth and policy options. Lec-

ture-discussion, 4 hours. Prerequisite: Undergraduate regional economic analysis or equivalent or consent of instructor.

EC 691 Directed Study (1–4)

Independent study in an area chosen by the student under the supervision and direction of a graduate faculty member. Maximum credit, 8 units.

EC 696 Thesis (1–3)

Independent research and study under the supervision of the faculty. Reporting the research results in the approved form. Maximum credit, 9 units.

EC 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree or admission to a credential program. The student must be enrolled in the university during the quarter in which he/she graduates.

EDUCATION

Master of Arts in Education

In the Teacher Preparation Center

David M. Greene, *Director*
Jane S. McGraw, *Associate Director*

Education Graduate Committee

George M. Platner, *Chair*

Roy A. Armstrong	Constance Lim	Ruth Petit
Rodman F. Garrity	Leo Lopez	Cecilia Cota-Robles Suarez
L. Virginia Johnson	Jane McGraw	

The primary emphasis of the Master of Arts in Education is to develop superior teachers. Admission to the program is granted to qualified applicants who hold a California teaching credential or its equivalent, and to students who have been admitted to the university's credential program. Study for the master of arts is a continuation at a higher level of the university's undergraduate programs that lead to teaching credentials. Post-baccalaureate students who are working on specialist credentials are encouraged to work concurrently on the master's degree.

Admission to the Program

An applicant for this program must have a valid teaching credential or have been admitted to a credential program at this university and hold a bachelor's degree from an accredited institution. Graduates of foreign universities are exempt from credential requirements.

Students entering the master's program are admitted with an "unclassified" status until the successful completion of TEP 500, Assessment of Competencies. After successfully completing that course, students are awarded "classified" status with the consent of the appropriate Associate Coordinator.

Applicants who do not meet the minimum grade point average of 2.5 for undergraduate work or 3.0 for graduate work, but who show compensating strengths, may be admitted conditionally. A student with conditional status is provided a written statement of entrance conditions including the time within which the conditions are to be met. If the conditions are not satisfied within the specified time, the student will be denied further enrollment in the program.

A student who holds a baccalaureate degree from this university and who plans to continue in graduate study will submit an application for change to graduate status to the Office of Admissions during the final quarter of the senior year.

Each M.A. student will complete a contract for a formal degree program in consultation with an adviser. When it is approved by the chairman of the Education Graduate Committee the student is designated the M.A. classification.

The approved program constitutes the student's curriculum for the master's degree. No change will be made in the program without the mutual agreement of the student and adviser.

Requirements

1. A minimum of 45 quarter units of acceptable graduate level work must be completed in the program; at least 24 quarter units must be at the 500 and 600 level (graduate). All 400-level courses credit will be specified by the Education Graduate Committee. Methods courses and student teaching shall not be applied to the master's degree.
2. A grade-point average of 3.0 (B) or better must be maintained in all courses to satisfy the requirements for the Master of Arts in Education.
3. Completion of all requirements for a clear teaching credential, or equivalent, is required prior to the granting of the degree of Master of Arts in Education.
4. A thesis or project must be satisfactorily completed.

Curriculum

The master's degree curriculum in education is a flexible one requiring a minimum of 45 units, organized as follows: 9–12 units in research and project/thesis, 18–24 units in a specific area, and 12–18 units of electives. Credit for twelve (12) quarter units of extension or transfer courses taken, or up to 18 quarter units of credit in a single specified area not offered by the Teacher Preparation Center, but taken at this university, may become a part of the M.A. contract. TEP 500 should be the first course taken on the M.A. program. Contracts are finalized during that course.

The curriculum consists of three elements. The first element consists of course work from the graduate offerings in education, selected by the student and adviser to meet the student's academic needs, based upon previous

preparation and the requirements of employment. Courses available for this purpose cover such areas as reading, instructional media, minority children, philosophy, bilingual/cross-cultural education, special education and measurement. Additional areas are planned for the future.

The second part of the curriculum is made up of approved upper-division and graduate electives from offerings in education or in other appropriate disciplines to complement the rest of the student's curriculum.

Credential Programs

The university offers a number of programs leading to certification for elementary and secondary school teaching as well as various specialists' credentials under the auspices of the Teacher Preparation Center. These are described in this catalog in the section which presents the programs of the center.

Graduate Course Descriptions

TEP 500 Assessment of Competencies (3)

Assessment of prospective Master of Arts candidates. Required for an M.A. Seminar, 3 hours.

TEP 509 Education of Contemporary Youth (3)

The dynamics of contemporary youth in the public secondary school. Values of youth, major problems, struggles, and conflicts as adolescents move toward maturity. Cultural and societal values which have an impact on youth; role of the teacher and school in helping young people achieve identity. Lecture-discussion, 3 hours. Prerequisite: TEP 393 or consent of instructor.

TEP 510 Interpersonal Relations in Teaching (3)

Examination of personality factors that are obstacles to effective teaching; emphasis upon developing open and authentic interpersonal relationships. Role-playing, demonstrations and other laboratory activities. Lecture-discussion, 3 hours. Prerequisite: TEP 393 or consent of instructor.

TEP 511 Introduction to Educational Microcomputers (3)

Theory and principles of programmed and individualized instruction with emphasis upon reading and special education computer programs, learning styles appropriate for the microcomputer. Criteria for selection of computer programs, hardware, software and expandability usages, educational functions and applications of microcomputer. BASIC systems and programming skills. Orientation to programming mastered in laboratory. Prerequisite: Permission of instructor. 2 lectures, 2 hour activity.

TEP 512 Advanced Educational Microcomputer Programming (3)

Advanced study of BASIC language programming for the microcomputer. Introduction to PILOT authoring language. Mastery of computer programming for the classroom teacher/administrator. Prerequisite: TEP 511 or approval of the instructor. 1 lecture, 4 hour activity.

TEP 513 Educational Microcomputers and Curriculum Design (3)

Principles of curriculum and instruction, microcomputer programming and criteria for selection of elementary and secondary programs. Management systems are reviewed. Classroom microcomputer program evaluation. Student will develop a program for utilization in classroom. Prerequisite: TEP 512 or approval of instructor. 2 lectures, 2 hour activity.

TEP 520 Diagnosis of Reading Difficulties (3)

Diagnosis and remediation of handicapped readers. Practice in diagnostic procedures, tests, and laboratory equipment. Use and interpretation of tests for the analysis of reading difficulties; methods of difficulty analysis, diagnostic test evaluation, assessment of psychological, emotional and physical factors. Lecture-discussion, 3 hours. Prerequisite: TEP 393 and 411.

TEP 521 Analysis of Corrective Reading Practices and Techniques (3)

Inhibiting factors associated with reading disabilities among school children; informal techniques of reading evaluation and corrective procedures in improvement of word recognition, vocabulary and comprehension skills; materials and organization of corrective programs. Group and individual techniques, case studies. Lecture-discussion, 3 hours. Prerequisite: TEP 520.

TEP 522 Laboratory of Clinical Practice: Treatment of Reading Disorders (3)

Observation and supervised experience in individual and group diagnostic therapeutic procedures. Supervised case study, diagnosis and remedial instruction in reading. Student will practice individual tutoring, group remedial activities, parent interviews, case study and clinic reports. Lecture-discussion, 2 hours, activity 2 hours. May be repeated. Maximum credit 6 units. Prerequisite: TEP 520 and 521.

TEP 523 Development of Pre-Reading Skills (3)

The young child's development in reading readiness. Clinical and laboratory experience in assessment of individual functioning in reading. Criteria for selection of curriculum materials and procedures in the development of pre-reading skills. Lecture-discussion, 3 hours. Prerequisite: TEP 393, 411, or consent of instructor.

TEP 524 Advanced Study of Reading Disability (3)

Classical and contemporary issues in reading disability. Emotional, neurophysiological, and cultural impediments to learning. Current approaches to diagnosis and treatment of severe cases of reading disability. Lecture-discussion, 3 hours. Prerequisite: TEP 522.

TEP 525 Psychology of Reading (3)

Historical development of selected theories and models of the reading process. Investigation and analysis of the interrelationships of the reading act: cognitive processes, languages, experience, and social-emotional factors. Lecture-discussion, 3 hours. Prerequisite: TEP 393, 411, or consent of instructor.

TEP 526 Strategies for Competency in Teaching Reading (3)

Basic reading skills; relevancy in the classroom teaching of reading; analysis of teacher effectiveness. Competency in testing and teaching for reading skills objectives. Lecture-discussion, 3 hours. Prerequisite: TEP 411 and 412 or 413.

TEP 527 Technology in Reading Instruction (3)

Educational technology; analysis and implementation of selected technological hardware, teaching machines, and instructional approaches as related to the development and management of reading instruction. Lecture-discussion, 2 hours; activity, 2 hours.

TEP 528 Linguistics, Phonics, and the Teaching of Reading (3)

Development of phonics and linguistics. Linguistically oriented reading and phonics programs. Applications of linguistics and phonic principles in the teaching of reading and the language arts. Lecture-discussion, 3 hours. Prerequisite: TEP 412 or 413.

TEP 529 Field Experiences for Specialist Credentials (1–12)

Field experience for Specialist Credential candidates to fulfill a competency criterion. May be repeated for credit. Prerequisite: Admission to a specialist credential program and consent of adviser. Maximum credit 12 units.

TEP 530 Education of the Slow Learner and the Retarded Child (3)

Etiology and origin of retardation. The training of the slow learner and the mentally retarded. Curriculum principles, methods, sources of materials with emphasis on reading. Lecture-discussion, 3 hours. Prerequisite: TEP 393 and consent of instructor.

TEP 531 Education of the Gifted Child (3)

Differential aptitudes and characteristics of gifted children; identification, acceleration, grouping and curriculum enrichment. Evaluation of programs, problems of underachievement, counseling, reading, development of talent. Lecture-discussion, 3 hours. Prerequisite: TEP 393.

TEP 532 Assessment and Reading Instruction (3)

Analysis of individual and group intelligence, achievement, interest, aptitude, behavior, and personality tests. Theory and practical application of diagnostic and criterion-referenced tests used with disabled readers' learning problems. Lecture-discussion, 2 hours; activity, 2 hours. Prerequisite: TEP 393.

TEP 533 Advanced Study in Learning Disabilities-Prescription (3)

Treatment of pupils with primary reading disabilities as well as secondary reading disabilities; methods, materials and prescriptions. 3 lectures. Prerequisite: TEP 524.

TEP 534 Linguistics and Reading—Methodology (3)

Methodology and prescription of multidisciplinary reading materials based on linguistic theory. 3 lectures. Prerequisite: TEP 528.

TEP 540 Historical and Philosophical Bases in Early Childhood (3)

History of the major forces in the education of the young child. Analysis of philosophies and major trends in early Childhood education. Lecture-discussion, 3 hours. Prerequisite: TEP 456 or teaching experience.

TEP 541 Learning Patterns in Early Childhood (3)

Examination and evaluation of learning skills in early childhood education: socio-emotional, perceptual-motor, and cognitive. Programs which emphasize specific learning patterns. Approaches to the evaluation of learning patterns in early childhood. Lecture-discussion, 3 hours. Prerequisite: TEP 540.

TEP 542 Advanced Curriculum and Instruction (3)

Major curriculum models used in early childhood, elementary and secondary education. Examination of curriculum emphasizing the needs of the student; the environment and the teacher. May be repeated for a total of 6 units. Prerequisite: Multiple Subject or Single Subject Credential. Lecture-discussion, 3 hours.

TEP 543 Implementation of Early Childhood, Elementary and Secondary Education Programs (3)

Instructional strategies to achieve curriculum goals in language arts, science, motor activities, music, art, and other major curriculum areas. Refer to Teacher Preparation center class schedule for specific group emphasis each quarter. May be repeated for a total of 9 units. Prerequisite: TEP 542 or permission of instructor. Lecture-discussion, 3 hours.

TEP 544 Advanced Child and Adolescent Development: Implications for Curriculum and Instruction (3)

Experimental and theoretical literature relating to the development of child and adolescent; implications for the student's continuing educational experiences. Prerequisite: TEP 456. Lecture-discussion, 3 hours.

TEP 545 Organization and Administration in Early Childhood Education (3)

Principles and practices of organization and administration in early childhood education. Organizational structure, budgeting, personnel policies and practices, records, statistics, reporting, relationship with community, relationship with regulatory agencies, relationships with parents. Lecture-discussion, 3 hours.

TEP 546 School, Community, and Home Relations (3)

Cooperative school, home, and community relations. Professional and community resources for family, health, welfare, and improving child and adolescent development. Implications fo school curriculum. Prerequisite: Permission of the instructor. Lecture-discussion, 3 hours.

TEP 550 Seminar in Educational Issues (3)

Intensive study of selected issues, problems, or areas in education, according to the interests of the students enrolled. Each seminar subtitled by its content. Seminar, 3 hours. May be repeated for a maximum of 9 units.

TEP 551 Mainstreaming Handicapped Learners (3)

Change processes in special education. Principles of mainstreaming, its purposes and background in relation to federal legislation requirements. Strategies for mainstreaming handicapped pupils including development and implementation of IEPs in least restrictive environments. 3 lectures. Prerequisite: TEP 454.

TEP 552 Career Education and Counseling for the Handicapped (3)

Examination and application of current theories and techniques in counseling exceptional pupils and their parents relative to personal, social, and vocational objectives including procedures to assess community resources and employment opportunities. 3 lectures. Prerequisite: TEP 454.

TEP 553 Assessment and Prescription for the Learning Handicapped (3)

Advanced study of theory and practice of assessment and evaluation of learning handicapped pupils. Experience in relating diagnostic and evaluative data to IEP prescriptive elements. 3 lectures. Prerequisite: TEP 454.

TEP 554 Curriculum Strategies for the Learning Handicapped (3)

Examination and evaluation of curriculum programs and development of curricula strategies appropriate to pupil learning modalities and developmental level. Application of learning principles to curriculum theories and educational considerations for the learning handicapped. 3 lectures. Prerequisite: TEP 454.

TEP 555 Assessment and Prescription for the Severely Handicapped (3)

Advanced study of theory and practice of assessment and evaluation of severely handicapped pupils. Experience in relating to diagnostic and evaluative data to IEP prescriptive elements. 3 lectures. Prerequisite: TEP 454.

TEP 556 Curriculum Strategies for the Severely Handicapped (3)

Examination and evaluation of curriculum programs and development of curriculua strategies appropriate to pupil learning modalities and developmental level. Application of learning principles to curriculum theories and educational considerations for the severely handicapped. 3 lectures. Prerequisite: TEP 454.

TEP 557 Directed Teaching with Learning Handicapped (12)

Supervised teaching with learning handicapped pupils in special class, resource center, and regular classroom settings. Integrates the competencies of the candidate for the specialist credential. Prerequisite: Admission to Special Education Specialist Program.

TEP 558 Directed Teaching with the Severely Handicapped (12)

Supervised teaching with the severely handicapped with emphasis upon use of current procedures within the context of classroom, home, and institutional settings. Prerequisite: Admission to Special Education Specialist Program.

TEP 560 Bilingual/Cross-Cultural Methodology: Social Studies, Language Arts (3)

Implementation of bilingual/cross cultural programs in social sciences and language arts. Effective instructional strategies to achieve curricular objectives.

TEP 561 Bilingual/Cross-Cultural Curriculum (3)

Curriculum development in theory and practice; processes and roles in curricular development; criteria for analysis and evaluation of curricula and instructional materials; analysis and planning of bilingual/cross-cultural programs. Lecture-discussion, 3 hours. Prerequisite: TEP 560; two years of college Spanish or equivalent; possession of a teaching credential or admission to a credential program.

TEP 562 Bilingual/Cross-Cultural Methodology: Mathematics, Science, Music and Art (3)

Implementation of bilingual/cross cultural programs in mathematics, science, music, and art. Classroom individualization and evaluation.

TEP 563 Organization and Administration of Bilingual Programs (3)

Models of leadership; planning and implementing an in-service program; reporting systems, including budgeting, planning, and accounting. Proposal writing; intra-institutional coordination for the preparation of grant requests. Lecture-discussion, 3 hours. Prerequisite: TEP 560; two years of college Spanish or equivalent; possession of a teaching credential or admission to a credential program.

TEP 564 Survey of Patterns of Language for Bilingual Teaching (3)

The nature of language structure; the development of language; Barrio dialects; similarities and differences among languages; linguistic change and reconstruction. Inter-relationships between language and culture in the Chicano community. Lecture-discussion, 3 hours. Prerequisite: TEP 560; two years of college Spanish or equivalent; possession of a teaching credential or admission to a credential program.

TEP 570 Utilization of Media in the Classroom (3)

Role of media in classroom learning. Systematic approach to instructional development of utilizing media. Skills in using equipment and materials. Lecture-discussion, 2 hours; activity, 2 hours. Prerequisite: Graduate standing.

TEP 571 Graphics for Classroom Instruction (3)

Planning, preparation, and utilization of graphic presentations in classroom learning. Charts, graphs, transparencies, mechanical lettering, mountings, and preserving techniques. Lecture-discussion, 2 hours; activity, 2 hours. Prerequisite: TEP 570.

TEP 572 Programmed Instruction for Classroom Use (3)

Application of current research and theory in the development of instructional programmed segments for classroom learning. Verbal programming and media-integrated programming. Lecture-discussion, 3 hours. Prerequisite: TEP 570.

TEP 574 Preparation of Audio Media (3)

Planning and preparation of scripts; production and recordings on cassette and reel-to-reel magnetic tape, video tape, and film. Principles of storing sound for retrieval. Lecture-discussion, 2 hours; activity, 2 hours. Prerequisite: TEP 571.

TEP 575 Preparation of Photographic Media (3)

Design and production of filmstrips, slides, and prints for classroom utilization. Development of accompanying instructional guides. Lecture-discussion, 2 hours; activity, 2 hours. Prerequisite: TEP 571.

TEP 576 Educational Use of TV and Video Tape (3)

Application of research and theory regarding classroom utilization of broadcasted programs; preparation and production of video tape recordings for classroom use. Lecture-discussion, 2 hours; activity, 2 hours. Prerequisite: TEP 574.

TEP 577 Instruction Film Production (3)

Perception and learning and their relation to program development; preproduction skills; production of instructional motion picture films. Lecture-discussion, 2 hours; activity, 2 hours. Prerequisite: TEP 574.

TEP 578 Administration in Media (3)

Implementation and administration of mediated learning centers including the production of mediated instructional segments for solving specific learning problems. Lecture-discussion, 2 hours; activity, 2 hours. Prerequisite: TEP 574.

TEP 580 Learning and Cognition (3)

Theoretical research on the different phases and developmental sequence of language development in children. Advanced research on the acquisition of language; the processes and ordering involved in acquiring vocabulary, syntax, and grammar. Emphasizes correlation between creativity, cognition and language. Includes practical study of oral language development in the affective and cognitive domains and later implications for reading comprehension. 3 lectures.

TEP 581 Teacher Instructional Behavior for the Handicapped (3)

Theory and practice in the application of neurology and learning theory to teacher instructional behavior with the handicapped. Prerequisite: TEP 454. 3 lectures.

TEP 582 Developmental Disorder in Learning and Behavior (3)

Study of learning disabilities and behavior disorders; the concept, terminology, significance, etiology, characteristics, and educational considerations of exceptional children and youth who present social and academic school learning problems. 3 lectures. Prerequisite: TEP 454 or consent of instructor.

TEP 583 Special Education Resource Specialist (3)

Problems and issues of exceptional individuals in the regular classroom; functions of the resource specialist. Lecture-discussion, three (3) hours. Prerequisites: Possession of a valid Special Education Credential.

TEP 584 Organization and Management of Special Education Program (3)

Legal compliance requirements in planning and financing special education programs. Conceptual frameworks and research in operation of special education procedures. Lecture-discussion, three (3) hours. Prerequisite: Consent of Special Education Coordinator.

TEP 585 Seminar in Educational Handicaps (3)

Seminar on problems of exceptional individuals. An examination and analysis of current problems, current curricular and instructional practices in special education. Lecture-discussion, three (3) hours. Prerequisite: Consent of Special Education Coordinator.

TEP 586 Counseling Parents of Handicapped Individuals (3)

Parent education; rights, due process, resource agencies, local state parent organizations, counseling and in-service training techniques and procedures. Lecture-discussion, three (3) hours. Prerequisite: Consent of Special Education Coordinator.

TEP 650 Seminar in Current Problems and Strategies in Education (3)

Critical treatment of new strategies, innovations, conditions, and the findings of research that currently affect or involve education. Choice of topics will be related to contemporary education problems. Seminar, 3 hours. May be repeated for a maximum of 9 units.

TEP 687 Specialist Credential Research Seminar (3)

Utilization of professional literature. Library reference paper, field research, curriculum innovation projects, action research, field studies. Seminar, 3 hours. Prerequisite: Consent of program coordinator.

TEP 688 Critique of Research in Education (3)

Survey and critical analysis of selected educational research and other related literature in the major divisions of education. Emphasis on fundamentals of research design and interpretation of related statistics. Lecture-discussion, 3 hours. Prerequisite: Admissions to master's degree study in education.

TEP 691 Independent Study (1–9)

An intensive study of a particular problem in education under the direction of a member of the Teacher Education Advisory Committee. May be repeated for a maximum of 9 units. Prerequisite: Consent of Graduate Coordinator.

TEP 695 Project (3-6)

Independent research leading to successful completion of a project. Open to classified graduate students and with approval of Graduate Coordinator. Maximum credit, 9 units. Prerequisite or concurrent: TEP 688.

TEP 696 Thesis (3-6)

Independent research leading to successful completion of a thesis. Open to classified graduate students and with approval of Graduate Coordinator. Maximum credit, 9 units. Prerequisite or concurrent: TEP 688.

TEP 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. The student must be enrolled in the university during the quarter in which he/she graduates.

ENGINEERING

Master of Engineering

In the School of Engineering

Seung P. Li, Director, Engineering Graduate Studies

Engineering Graduate Studies Committee

Seung P. Li, *Chair*

Ronald L. Carlyle	Richard Hermsen	T. K. Nguyen
George Graves	John D. O'Neil	Carl Rathmann

The School of Engineering offers an interdisciplinary graduate program leading to the Master of Engineering degree which, coupled with a bachelor's degree, will provide the student with a comprehensive preparation for entry into the engineering profession.

The program is designed to accept students with diverse undergraduate engineering backgrounds. A candidate for the Master of Engineering degree will have the opportunity to choose from technical courses in engineering disciplines supported by the School of Engineering. The School of Engineering offers undergraduate degree programs in the recognized disciplines of aerospace, chemical, civil, electrical and computer, industrial, and mechanical engineering.

The student will complete a course of study tailored to individual talents and professional goals. The course of study will feature breadth supplemental to the student's undergraduate education as well as courses designed to increase his or her general engineering competency and to emphasize the technical area of the student's choice.

Admission to the Program

An applicant for admission to this program must meet university criteria as specified in the Admission section of this catalog as well as the criteria outlined below. Applicants are advised that a reasonable proficiency in computer languages is necessary for successful completion of this program. If the student is deficient in this area, he or she will be expected to remove the deficiency early in the program.

UNCONDITIONAL ADMISSION

An applicant who meets the requirements of this section will be admitted to the university and to this program with classified standing. Such status will be granted upon recommendation of the engineering graduate studies director and approval by the Dean of Engineering.

The applicant must hold a baccalaureate degree in engineering from an Accreditation Board for Engineering and Technology (ABET) approved curriculum. He or she must have attained a GPA of 3.0 in all undergraduate upper division courses and 3.0 for courses completed with graduate standing.

CONDITIONAL ADMISSION

An applicant holding a baccalaureate degree not in engineering or a baccalaureate degree in engineering from a non-ABET accredited curriculum will be required to submit a test score of the advanced Graduate Record Examination in Engineering, in addition to his/her University transcript. An applicant may be admitted to the program with specified conditions upon recommendation by the graduate studies director and approval of the Dean of Engineering. The applicant will be expected to complete acceptable academic preparation as determined by the appropriate department.

When an applicant is admitted conditionally, the conditions are stated in the letter of admission. This statement will specify the conditions to be met and the time allowed for meeting them. If the conditions are satisfactorily met, the student will be accorded full classified standing. If the conditions are not met, the student will be disqualified from the program and not be permitted to re-enroll.

Scholastic Requirements

GRADUATE COURSES TAKEN BY UNDERGRADUATES

A senior wishing to receive graduate credit for a course must petition through the graduate studies office, with the approval of his or her major department adviser. The petition must be filed before or during the first three weeks of the quarter in which the course is being taken. The petition will ordinarily be approved if the student is not on probation and the course is suitable for graduate credit. If approved, the credit will be recorded as graduate credit, not available for use in meeting baccalaureate degree requirements. (Also see Page 82).

Approval of the petition does not constitute acceptance of the courses toward the master's degree unless and until a degree program including such courses has been approved by the engineering graduate studies committee.

ADVANCEMENT TO CANDIDACY

A student who is admitted in unconditional classified standing, or who has changed his standing from conditional to unconditional by meeting the specified requirements and submitting a petition, is considered to be advanced to candidacy for the Master of Engineering degree.

GENERAL REQUIREMENTS

General requirements for master's degrees are stated in the Graduate Scholastic Requirements section of the catalog.

After the student has been admitted to the program, a graduate adviser will be appointed. With the adviser's help, a degree program will be derived for the student and submitted for approval to the engineering graduate studies director. The program will list all courses and requirements which the student must fulfill to earn the degree. Any deficiencies in fundamental subject areas will require prerequisite courses.

A minimum of 45 quarter units will be required with a minimum of 24 quarter units of 500 or 600 level courses. Transfer credits not exceeding 13 quarter units completed in graduate standing at an accredited college or university may be accepted upon recommendation of the graduate adviser and approval of the engineering graduate studies director.

CURRICULUM

1. A minimum of 16 quarter units will be selected to meet the breadth requirement. Of these, a minimum of 4 units will be in mathematics or engineering analysis (EGR 510, 511, 512, 513, 514, 515, 540, 559, and 640). The specific courses will be determined according to the nature of the student's undergraduate program of study. Breadth will be insured by a combination of broadly based courses, e.g., mathematics, science, and engineering courses. The criterion for the choice of engineering courses will be that of breadth experience for the student as judged by comparing the proposed courses against the rest of the student's undergraduate and graduate programs.
2. A minimum of 12 quarter units will be selected to emphasize a technical area supported by the engineering disciplines of the School of Engineering. Normally, such courses will be 500 and 600 level, selected by the student with the approval of an adviser to provide a logical continuation of the design, synthesis, and systems effort of the student's undergraduate curriculum. For this technical area requirement no more than 4 units may be transferred from another institution.
3. All candidates are required to prepare a thesis, accomplish a project, or pass a comprehensive examination. For information regarding the comprehensive examination consult with the Director, Engineering Graduate Studies.
4. The remainder of the courses in the student's program will be chosen to insure that it is consistent with the student's undergraduate preparation and graduate goals to provide a sequential development of the design, synthesis, and systems approach of his or her undergraduate work, and to constitute an integrated educational experience.
5. The student will consult with his or her adviser and the professor in charge of each course to determine whether the student's previous coursework has provided the prerequisite information for that course.

UPPER-DIVISION COURSES

The following engineering courses are considered by the department concerned to be suitable for graduate credit. Credit toward the Master of Engineering degree will be given only upon approval of the student's program by the graduate studies committee. Graduate credit for an undergraduate student will be given only upon petition in advance. Other upper division engineering courses and upper division courses at the University may be granted graduate credit upon petition in advance.

ARO 401	CE 406	ECE 402	ECE 428	CHE 415	ME 430
ARO 402	CE 421	ECE 403	ECE 430	CHE 425	ME 438
ARO 403	CE 427	ECE 405	ECE 431	CHE 426	ME 439
ARO 405	CE 428	ECE 406	ECE 432	CHE 427	
ARO 406	CE 429	ECE 407	ECE 434	CHE 432	
ARO 407	CE 431	ECE 408	ECE 435	CHE 441	MTE 404
ARO 408	CE 432	ECE 409	ECE 460	CHE 442	MTE 405
ARO 409	CE 433	ECE 410	ECE 469	CHE 443	MTE 406
ARO 410	CE 434	ECE 412			
ARO 411	CE 437	ECE 413	IE 403		
ARO 412	CE 442	ECE 414	IE 405	ME 406	
ARO 415	CE 443	ECE 418	IE 416	ME 407	EGR 401
ARO 416	CE 450	ECE 420	IE 417	ME 408	
ARO 418	CE 451	ECE 421	IE 419	ME 411	
ARO 426	CE 454	ECE 422	IE 426	ME 412	
ARO 427	CE 455	ECE 424	IE 429	ME 414	
ARO 431	CE 456	ECE 425	IE 437	ME 417	
ARO 435	CE 457	ECE 427		ME 418	
ARO 444			IME 415	ME 421	
ARO 445					

Graduate Course Descriptions

EGR 510 Engineering Probability and Statistics (4)

Mean square estimation, introduction to stochastic processes, time averages and ergodicity, continuous testing and estimation, confidence intervals, significance, thermodynamics, machine design, systems analysis, and reliability. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course in probability theory.

EGR 511 Numerical Solutions of Engineering Problems (4)

Advanced interpolation and approximation methods. Advanced integration concepts. Solution of ordinary differential equations. Systems of differential equations. Statistical methods. Applications to electrical networks, transport phenomena, structural systems, dynamical systems, etc. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course in numerical analysis or consent of instructor.

EGR 512 Vector Analysis and Complex Variables (4)

Vector and scalar fields. Gradient, divergence, curl. Green and Stokes theorems. Complex functions and conformal mapping. Applications in electrodynamics, heat transfer, fluid dynamics and aerodynamics. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ABET accredited curriculum.

EGR 513 Engineering Tensor Analysis (4)

Vector-tensor notation. Generalized coordinate systems. Tensor algebra and calculus. Transport and conservation laws in continuum mechanics. Formulation and modeling of engineering phenomena. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ABET accredited curriculum.

EGR 514 Variational Methods in Engineering (4)

Calculus of variations. Approximate methods. Applications in fluid dynamics, heat transfer, dynamics, structures. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ABET accredited curriculum.

EGR 515 Matrix Methods in Engineering (4)

Application of matrix methods in engineering analysis. Matrix algebra. Eigenvalues and eigenvectors. Energy techniques. Transformations. Applications in classical mechanics, analysis of structures, circuit analysis, vibrations, heat transfer and fluid dynamics. Lecture-discussion, 4 hours. Prerequisite: Mathematics equivalent to ABET accredited curriculum.

EGR 516 Advanced Indeterminate Structures (4)

Analysis of multi-degree of freedom systems by slope deflection and superposition of distribution process. Elements of matrix application including flexibility and stiffness methods. Deflection of continuous trusses and frames. Stability analysis of beam-column utilizing classical strain energy theorems. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in structural analysis.

EGR 517 Advanced Steel Design (4)

Structural steel analysis and design including long span and tapered girders, orthotropic plates, space frames. Column stability and post buckling states, secondary stresses. Design of lateral force resistant building frames and composite steel-concrete systems. Plastic analysis and design of rigid frame structures. Lecture-discussion. 4 hours. Prerequisite: Upper-division course in structural steel analysis.

EGR 520 Elasticity (4)

Theory of stress and strain for continuous media. Stress-strain relations of elasticity. Plane stress and strain. Introduction to thermoelasticity. Lecture-discussion, 4 hours. Prerequisite: Upper division courses in structural analysis and tensor analysis.

EGR 521 Structural Dynamics (4)

Concepts of the dynamics of elastic bodies. Longitudinal, transverse and torsional vibrations of structural elements. Vibrations of plates and shells. Approximate methods in dynamics of strucures. Lecture-discussion, 4 hours. Prerequisite: Upper division courses in structural analysis and dynamics and EGR 515.

EGR 522 Advanced Reinforced Concrete Design (4)

Advanced design and analysis of continuous building frames to include floor systems, eccentrically loaded columns, folded plate and shell roof elements. Retaining structures, composite deck sections. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in design of reinforced structures.

EGR 523 Prestressed Concrete Design (4)

Design and analysis of prestressed concrete components including slabs, beams, and columns utilizing both elastic and ultimate strength design concepts; special problems involving composite design of structural systems. Lecture-discussion, 4 hours. Prerequisite: Upper division course in reinforced concrete design.

EGR 525 Foundation Engineering (4)

Advanced foundation engineering analysis and design of footings, mats, raft foundations, piles, caissons, and retaining structures. Survey of the analysis and design of cofferdams, abutments, tunnel shoring, and buried pipes. Lecture-discussion, 4 hours. Prerequisite: Upper division course in soil mechanics.

EGR 526 Hydrodynamics (4)

Fluid stress and rate of strain relationships. Momentum and energy similarity parameters. Fluid turbulence. Free turbulent flows. Hydraulic flows. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in fluid mechanics.

EGR 527 Advanced Gas Dynamics (4)

Method of characteristics and application; non-steady flows; the blunt body problem and curved shock waves; similarity rules; real gas results; Newtonian gas dynamics. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in gas dynamics.

EGR 528 Hypersonic Aerodynamics (4)

Two- and three-dimensional flow fields. Hypersonic small disturbance and Newtonian impact theories and application. Boundary layer interaction with the inviscid flow field. Real gas phenomena. Blunt body and conical flow fields; minimum drag bodies; aerodynamic analysis of complete configurations. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in supersonic aerodynamics.

EGR 529 Nuclear Engineering (4)

Principles of nuclear power generation; nuclear fission; neutron reactions; accumulation, radioactivity and decay of fission products; nuclear waste management; heat generation and removal; nucleate boiling and burnout; two-phase heat transfer and fluid flow; boiling water reactors; pressurized water reactors; liquid metal cooled reactors; breeder reactors. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in nuclear engineering.

EGR 532 Conduction Heat Transfer (4)

Application of principles of heat transfer and thermodynamics in solution of steady-state and transient heat transfer problems. Classical heat conduction theory. Derivation of Fourier field equation and integration of various single and multidimensional problems. Detailed discussion of thermal conductivity. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in heat transfer.

EGR 533 Mechanical Metallurgy (4)

Study of the mechanical behavior of metals. Fundamental mechanisms controlling deformation phenomena, strain-hardening, creep, fatigue, and fracture. Strengthening mechanisms involving alloying and heat treatment. Lecture, 4 hours. Prerequisite: Undergraduate courses in strength of materials and materials science.

EGR 534 Fracture of Solids (4)

Engineering and microscopic approaches, fracture of steels, creep and fatigue, stress corrosion cracking, and hydrogen embittlement. Lecture-discussion, 4 hours. Prerequisite: Upper division course in stress analysis.

EGR 535 Advanced Fluid Dynamics (4)

Reynolds Transport Theorem. Rotation, stress, and rate-of-strain relatinships. Ideal fluid flow. Conformal Transformations. Surface Waves. Viscous Flows, Exact Solutions and Low-Reynolds-Number Solutions. Lecture-discussion, 4 hours. Prerequisites: Upper-division courses in fluid mechanics, upper-division course in complex variables, or consent of the instructor.

EGR 538 Advanced Engineering Economy (4)

Engineering economic decision criteria and models for evaluating capital investment proposals and engineering projects. Replacement studies, risk and uncertainty, tax effects, intangibles, probabilistic models, computer techniques. Lecture-discussion, 4 hours. Prerequisite: Three quarter units of undergraduate engineering economy.

EGR 539 Advanced Human Factors in Engineering Design (4)

Methods and research techniques in engineering design of optimum man-machine systems. Designing systems with the objective of developing optimum combinations of physical and human components. Effects of environment on human performance. Man-machine dynamics. Lecture-discussion. 4 hours. Prerequisite: Upper division course in human engineering principles.

EGR 540 Systems Theory (4)

Application of matrix theory and linear vector spaces to the mathematical representation of systems. Analysis of the state equations for linear, time varying and invariant, continuous and discrete systems. Lecture-discussion, 4 hours. Prerequisite: EGR 515.

EGR 544 Communication Theory (4)

Selected advanced topics in communication systems such as information theory for continuous and discrete channels; signal detection and recognition; coding for optimal communication nets. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in communications systems.

EGR 545 Advanced Engineering Thermodynamics (4)

Development of concept of equilibrium. Reversible and irreversible principles of thermodynamics, second law consequences; estimation and correlation of thermodynamic properties. Physical basis of conservation equations. Statistical foundations. Lecture-discussion, 4 hours. Prerequisite: Upper-division courses in thermodynamics.

EGR 546 Heterogeneous Phase Equilibria (4)

Applied phase equilibria. A development of theoretical and empirical principles for understanding complex multiphase behavior in multicomponent chemical systems. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in engineering thermodynamics.

EGR 547 Separation Processes (4)

Design, cost and energy requirements for separation processes. Topics include equilibrium processes, multistage processes, binary and multi-component systems. Lecture-discussion, 4 hours. Prerequisite: Senior level course in separation unit operations.

EGR 548 Solid State Electronics (4)

Quantum theory and atomic structure. Classical and quantum statistics. Description of crystal structures. Lattic vibrations. Band theory of solids. Transport phenomena in semi-conductors and metals. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in solid-state electronics.

EGR 549 Advanced Methods in Operations Research (4)

Methodology of operations research and algorithms for system and subsystem optimization; emphasis on methods yielding practical numerical procedures. Linear programming and extension, dynamic and integer programming, queuing theory, network analysis, game theory and decision theory. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in operations research.

EGR 550 Advanced Transport Phenomena (4)

Differential balances for momentum, heat, and mass transfer. Convective energy, mass, and momentum transfer; internal and external flow, exact and approximate solutions. Application for space vehicle re-entry, binary and multicomponent systems, nuclear reactor cooling, mass transfer and heat exchanger analysis. Lecture-discussion, 4 hours. Prerequisite: Upper-division courses in heat transfer and fluid mechanics.

EGR 551 Minimal Design and Testing of Sequential Logic (4)

Techniques of minimizing or decomposing combinational, sequential, and iterative circuits, finite state machine models, transition graphs, machine idenitification, decomposition, regular expressions, machine description, and lossless machines. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course which includes sequential design techniques.

EGR 552 Formal Languages and Computer Design (4)

Grammar and context free languages. Formal languages as applied to computer modeling and abstractions. Selected topics in computer design including asynchronous logic design and advanced concepts in parallel operations. Lecture-discussion, 4 hours. Prerequisite: Upper division course in logic design.

EGR 553 Computer Simulation of Engineering Systems (4)

Systems theory as foundation for engineering analysis and synthesis of complex systems. Numerical methods and simulation models using digital computers. Optimization of engineering systems design and performance. Applications to engineering systems problems. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course in computer programming.

EGR 554 Speech Analysis and Synthesis (4)

Speech Properties. Analog and Digital representation of Speech Signals. Speech Recognition. Speech Synthesis. Speech Understanding. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in Digital Electronics and Fourier Transform.

EGR 555 Microprocessor-based Control Systems (4)

Typical Computer Control Systems. Supervisory and DDC Control. Mathematics of Sample-data Control Systems. Development of controller algorithms using Z-transforms and microprocessors. On-Line Identification Techniques. Advanced Control Techniques. Typical Microprocessor-based process Control Systems. Lecture-discussion, 4 hours. Prerequisite: Upper-division courses in microprocessor and control theory.

EGR 556 Advanced Mechanics of Materials (4)

Theories of failure, dynamic loading, unsymmetrical bending, shear center, curved beams, thick-walled cylinders, inelastic action (limit design), residual stresses, energy methods, repeated loading (fatigue), stress concentration. Lecture-discussion, 4 hours. prerequisite: Upper-division course in stress analysis.

EGR 557 Analysis of Mechanical Designs (3)

Analysis of common machine elements. Relation to design decision making. Optimization, reliability, miniaturization, and statistical strength theory. Lecture-discussion, 3 hours. Prerequisite: Upper-division course in stress analysis.

EGR 559 Pattern Recognition (4)

Analysis and design of parametric and linear classifiers for optimal classification. Introduction to feature extraction and reduction. Applications in many diverse fields such as river pollution recognition, medical diagnosis, digital signal recognition, etc. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in probability theory.

EGR 560 Information Theory and Coding (4)

Channel models, coding theorems, coding systems, statistical properties of information sources. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in probability theory.

EGR 561 Computer-Aided Circuit Design (4)

Device modeling, numerical techniques for solving network equations in the frequency and time domains, design techniques using adjoint circuits, recent network design and analysis programs. Lecture-discussion, 4 hours. Prerequisite: Upper division course in computer aided circuit design.

EGR 562 Advanced Microwave Engineering (4)

Analysis of microwave components and networks, Green's functions; plane, cylindrical, and spherical wave functions; wave guides, cavities, scattering and diffraction of waves, microwave networks and radiation. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course in field theory.

EGR 563 Solid State Microwave Devices and Circuits (4)

Introduction to parameter matrices and microwave circuit design techniques. Microstrip lines. Design and evaluation of FET amplifiers, FET oscillators. Varactors, mixer diodes, control devices and their microwave circuit applications. Computer aided design of microwave circuits. New developments. 4 lectures. Prerequisites: Upper-division courses in EM theory and linear active circuits.

EGR 564 Radiation Heat Transfer (4)

Radiation properties of surfaces; radiant interchange among surfaces separated by radiatively non-participating media including the interchange among black and gray surfaces; radiant energy transfer through absorbing, emitting, and scattering media. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course in heat transfer.

EGR 565 Water Quality Analysis (4)

Application of chemical principles to analysis of natural water systems, water purification technology, and water pollution control. Physiology of organisms of importance in water supply and in waste-water treatment processes. Enzymatic reaction. Biochemical oxidation and fermentations. Ecology and eutrophication. Lecture-discussion, 3 hours, laboratory 3 hours. Prerequisite: Undergraduate lecture and laboratory course in sanitary engineering.

EGR 566 Fundamentals of Aseismic Design (4)

Characteristics of strong ground motion, causes, response spectra, earthquake response of single degree and multiple degree of freedom systems. Structural analysis and design based on UBC and SEAOC recommendations relative to earthquake-resistant design. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in Structural Analysis.

EGR 567 Unit Processes in Water and Wastewater Treatment (3)

The physical and chemical unit processes in water and waste treatment, relationship of design practice and theory, operational considerations, and the optimization of unit processes; aeration, sedimentation, flocculation, flotation, adsorption, filtration, ion exchange, coagulation, corrosion, control, and disinfection. Lecture-discussion, 3 hours. Prerequisite: Upper division course in sanitary engineering.

EGR 568 Biological Unit Processes in Waste Water Treatment (4)

Microbial reactions related to water and waste water treatment. Biological interactions in various unit processes related to design and operational considerations required for optimization; disinfection, activated sludge, trickling filters, and sludge digestion. Lecture-discussion, 4 hours. Prerequisite: Upper division course in sanitary engineering.

EGR 569 Groundwater Hydrology (4)

Properties of water-bearing materials, hydraulic conductivity, the equation of continuity, incompressible and irrotational flow, and basic differential-flow equations. Geohydrology and water level fluctuations in response to natural and artificial loads. Optimum design, groundwater modeling techniques, and groundwater basic management. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in hydrology.

EGR 570 Boiling Heat Transfer (4)

Examination and analysis of heat transfer characteristics and physical events associated with nucleate and film boiling, drop-wise and film-wise condensation, and two-phase flow. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in transport phemomena, undergraduate course in heat transfer.

EGR 573 Advanced Operations Planning and Control Systems (4)

Operations analysis of integrated production systems; mathematical and computer models for planning, scheduling, and control of production and service systems. Statistical techniques in forecasting; optimization of resources utilization. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in operations research.

EGR 574 Advanced Facilities Planning (4)

Planning, analyzing, justifying, controlling, and evaluating physical facilities. Long- and short-range facilities plans, decision criteria, authorization and control procedures, post completion audits. Resource allocation, optimization, simulation, and computer techniques. Technical, economic, ecological, safety, and intangible factors. Case studies. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course in engineering economy.

EGR 576 Combustion Theory (4)

Molecular structure and statistical thermodynamics. Real gases. Transport phenomena. Chemical reactions in gases. Reactive gas dynamics. Combustion phenomena and diffusion flames. Premixed gas flames; flame propagation, cellular flames, quenching. Aerodynamics of flames; flame shape, turbulent flames. Detonation. Applications. Lecture-discussion, 4 hours. Prerequisite: Undergraduate courses in thermodynamics and heat transfer.

EGR 577 Wing-Body Aerodynamics (4)

Three dimensional wings; steady, subsonic flow; supersonic flow. Lifting line theory: span-wise lift distribution, induced drag, twist, sweepback. Introduction to lifting surface theory: planar, nonplanar, interference. Transonic small-disturbance flow. Unsteady flow. Conical flows. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course in aerodynamics.

EGR 578 Aircraft Stability (4)

General equations of unsteady motion. Stability derivatives. Stability of uncontrolled motion; longitudinal, lateral. Response of the vehicle to actuation of the controls. Flight in turbulent air. Automatic stability and control. Specialization to missiles. Simulation. Transfer functions. 4 lectures. Prerequisite: Undergraduate course in stability and control.

EGR 579 Vibration and Flutter (4)

Two- and three-dimensional flutter theory. Structural damping. Aerodynamics forces. Flutter stability. Non-linear characteristics. Aspect ratio and compressibility effects. Empennage vibration and flutter analysis. Wing torsional divergence, aileron reversal and effectiveness. Modeling concepts. Lecture-discussion, 4 hours. Prerequisite: Upper-division courses in aerodynamics, structures and dynamics and EGR 515.

EGR 580 Materials for Electronics (4)

Preparation techniques for materials used in electronic devices. Structure and purity control. Crystal growth, epitaxy, vapor deposition, magnetic domains, and solid state phase transformations. Current problems concerning Si and III-V compound device production and research. Lecture-discussion, 4 hours. Prerequisite: An undergraduate course in materials science.

EGR 581 Open Channel Hydraulics (4)

Advanced topics in open channel flow. Energy and momentum principles applied to non-prismatic channels. Gradually varied flow. Rapidly varied flow. Computer applications. Lecture-discussion, 4 hours. Prerequisite: Upper-division lecture and laboratory hydraulics course.

EGR 582 Hydraulic Structures Design (4)

Applications of hydraulics, reinforced concrete, strength of materials, soil mechanics, and dynamics, to hydraulic structures design, including headworks conveyance systems and distribution systems such as dams, spillways, inverted siphons, water measuring devices, drop or chute structures, flumes, culverts, and regulators. Lecture-discussion, 4 hours. Prerequisite: Upper-division courses in hydraulics and reinforced concrete.

EGR 584 Convective Heat Transfer (4)

Conservation principles. Fluid stresses and flux laws. Laminar and turbulent boundary layers. Internal flow; noncircular cross section, entrylength, asymmetric heating. External flow; variable velocity, injection, specified temperature and heat flux distribution. Temperature dependent fluid properties. Computer solutions. Lecture-discussion, 4 hours. Prerequisite: Undergraduate course in heat transfer.

EGR 585 Computer Organization (4)

A survey of organization, programming and design of digital computers. A study of a hardware programming language and machine organization in relation to the subsystems of a computing machine. New trends in computer hardware, organization and applications. Lecture-discussion, 4 hours. Prerequisite: Upper division course in logic systems design or consent of instructor.

EGR 587 Advanced Integrated Circuit Applications (4)

The analysis and applications of the latest linear integrated circuits. Operational amplifier stability and compensation techniques. The phase-lockloop transfer functions, noise performance, tracking, and acquisition. RF Amplifier design techniques, matching, low noise specifications, and signal-to-noise ratio optimization. COS/MOS devices, equivalent circuits, gain configurations, and applications, Lecture-discussion, 4 hours. Prerequisite: Two upper-division courses in linear active circuits.

EGR 588 Biological Control Systems (4)

Application of control systems analysis to biological control systems. Development of mathematical models of selected biological control systems and the application of computer techniques in simulation of these systems. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in control systems.

EGR 589 Antenna Theory (4)

Dipole, loop and small antennas, arrays, wire, aperture, lens, horns, reflectors and other special antenna; currents and impedances; radiation and radiation patterns. Lecture-discussion, 4 hours. Prerequisite: two upper-division courses in field theory.

EGR 590 Solar Energy Systems (4)

Analysis of advanced, hybrid solar collectors. Advanced solar energy storage. Design of solar energy systems. Lecture-discussion, 4 hours. Prerequisite: Upper division course on solar energy or equivalent.

EGR 591 Direct Energy Conversion (4)

Conversion of primary chemical, nuclear, solar and heat energy directly to electrical energy without intermediate mechanical elements. Fuel cells, solar cells, magnetohydrodynamic generators, and fusion plasma generators. Lecture-discussion, 4 lectures. Prerequisite: Upper-division course in thermodynamics.

EGR 595 Boundary Layer Concepts (4)

Treatment of Newtonian and nonNewtonian fluids in the laminar and turbulent regimes. Positive and negative pressure gradients. Development of the thermal boundary layer. Some exact and inexact solutions. Wedge flow. Lecture-discussion, 4 hours. Prerequisite: EGR 535 and EGR 584.

EGR 599 Special Topics for Graduate Students (2-4)

Lecture-discussion of selected topics comprising new or experimental courses not otherwise offered. Each offering identified in the current schedule and on the student's transcript. Prerequisite: Consent of instructor.

EGR 616 Advanced Indeterminate Structures (4)

Advanced finite element techniques, stiffness method, numerical techniques; stability and non-linear analysis; plate and shell elements. Lecture-discussion, 4 hours. Prerequisite: EGR 515, 516.

EGR 618 Stability of Structures (4)

Stability of beam columns; elastic and inelastic buckling of straight columns; torsional buckling of bars; lateral buckling of beams; local buckling of plate elements; stability to frames. Lecture-discussion 4 hours. Prequisite: EGR 511.

EGR 630 Theory of Structural Plates and Shells (4)

Flexural theory of thin plates of various forms; stability of flat plates; small deflections of laterally loaded plates; effect of various edge restraints; optimum design of plate-type structures; general theory of thin shells involving stresses and deformation; stability analysis of thin shells; design of thin shell concrete roofs. Lecture-discussion 4 hours. Prerequisite: EGR 511.

EGR 631 Atmospheric Pollution Dynamics (4)

Shifting equilibrium kinetics; rate constants, branching chain. Catalysis; rates, diffusion, mixing. Atmospheric environment; remote sensing, simulation, eddy diffusion. Coagulation of an aerosol. Atmospheric boundary layer; turbulence. Photochemical smog; chemical kinetics, modeling, simulation. Lecture-discussion, 4 hours. Prerequisite: Upper division course in atmospheric pollution. EGR 511, 535, or equivalents.

EGR 640 Systems Theory (4)

Nonlinear systems and perturbation theory; stability for linear and nonlinear systems using Liapunov methods; controllability and observability of linear systems. Lecture-discussion, 4 hours. Prerequisite: EGR 540.

EGR 641 Advanced Network Analysis (4)

General analysis procedures for linear networks. Properties and limitations of linear networks. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in networks analysis and EGR 540.

EGR 642 Digital Control Systems (4)

Basic theory of sampling, quantizing and modeling of the digital computer for computer controlled feedback systems. State-space and Z-transform representation. Time response stability and design using both classical and modern techniques. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in control systems and EGR 540.

EGR 649 Advanced Methods in Operations Research (4)

Mathematical models for optimizing systems and subsystems. Integer programming, non-linear programming, and markov chains included. Lecture-discussion, 4 hours. Prerequisite: EGR 549.

EGR 652 Nonlinear Control Systems (4)

Numerical approximation methods in the solution of non-linear systems. Phase-plane techniques including method of isoclines, delta, and analysis of singular points. Describing function techniques, perturbation reversion, variation of parameters and harmonic balance methods. Liapunov stability methods. Lecture-discussion, 4 hours. Prerequisite: Upper-division course in control-systems and EGR 540 or consent of instructor.

EGR 655 Advanced Analytical Dynamics (4)

Lagrange's equations, Hamilton's principle, variational principles, equations of motion in Eulerian angle systems, characteristic equation of inertia matrix, cuspidal motion and nutation. Lecture-discussion, 3 hours. Prerequisite: EGR 511 and upper-division course in dynamics.

EGR 685 Advanced Computer Organization (4)

Use of a hardware design language based on APL to describe microprogramming, hardwiring, intersystem communications, fast arithmetic operations, large and special purpose digital machines. Lecture-discussion, 4 hours. Prerequisite: EGR 585.

EGR 691 Directed Study (2–3)

Analytical or laboratory investigation, under direction of a graduate faculty member, of selected engineering problems with emphasis on individual initiative in gathering and organizing data and reporting results. Maximum credit 3 units.

EGR 695 Master's Degree Project (2–4)

Independent investigation resulting in a project. Credit assigned upon successful completion of a project approved for the master's degree. Open to classified graduate students with approval of the major professor. Maximum credit 6 units, minimum 4 units. Students may take 2–4 units per quarter.

EGR 696 Master's Degree Thesis (2–4)

Independent research resulting in a thesis. Credit assigned upon successful completion of a thesis approved for the master's degree. Open to classified graduate students with approval of the major professor. Maximum credit 9 units, minimum 4 units. Students may take 2–4 units per quarter.

EGR 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. The student must be enrolled in the university during the quarter in which he/she graduates.

ENGLISH

Master of Arts in English

In the Department of English and Foreign Languages, School of Arts

Harold P. Levitt, *Chair*

George Stavros, *Graduate Coordinator*

The primary objective of the Master of Arts program in English is to develop in the student a critical understanding of literature beyond the undergraduate level by cultivating in him an ability, through close reading of the literary text, to appreciate its form and explain the interrelationships of its part in the whole. Professionally, the program is designed to prepare competent English teachers for community college and high school, and students who wish to proceed immediately to doctoral work.

Admission to the Program

For admission as a classified student in the Master of Arts program, the applicant should present a well-balanced undergraduate program—one that includes work in all the major periods, American literature, Shakespeare, Chaucer, literary criticism, and the English language. Deficiencies in any of these areas will be made up by course work; however, at the discretion of the chairman of the departmental graduate committee, a portion of such work may count toward the 45 units required for the degree. The student's grade point average in the upper division English courses of his undergraduate program must be at least 3.0. A student who does not meet these requirements may request special consideration for admission as a conditional student.

Admission to candidacy in the master's degree program in English will require the completion of at least 15 quarter units of graduate work in English, in residence, with an average grade of B. No grade below C will be accepted to meet this requirement.

Requirements and Curriculum

1. Foreign Language

A candidate for the M.A. in English should be conversant in a foreign language. Normally, this means that level of achievement gained by two years of college study in the language. Variations of experience are such, however, that no single statement can be made. All candidates, therefore, are requested to consult with their advisors about the foreign language requirement.

2. Comprehensive Examination

Requirements for the degree include the successful completion of a final comprehensive examination.

3. Course Work

The candidate will complete 45 units as follows:

Required Course

ENG 500 Introduction to Graduate Research 3

Alternate Requirements—18 units

The student's program must show 6 units in each of Groups I and II and 6 units in Group III and/or Group IV. In Groups I and II, the English and American literature sequences, study is to be continuous within any given literary period; in Groups III and IV, study need not be in sequence.

Group I 6

ENG 551, 552 Studies in English Literature

a. to 1500
b. 1500–1660
c. 1660–1800
d. 19th Century
e. 20th Century

Group II 6

ENG 561, 562 Studies in American Literature

a. to 1800
b. 19th Century
c. 20th Century

Group III 3–6

ENG 571, 572 Studies in Fiction
ENG 573, 574 Studies in Drama
ENG 575, 576 Studies in Poetry

ENG 577, 578 Studies in Non-Fictional Prose

Group IV 3–6
ENG 581, 582 Studies in the English Language
ENG 585 Problems in Teaching English as a Second Language
ENG 586 Problems in Teaching High School Composition
ENG 587 The Teaching of Basic Language Skills
ENG 588 Problems in Teaching College Freshman Composition
ENG 589 Developmental Reading in the Secondary School and Community College

Elective Courses—24 units

These may include electives listed under Alternate Requirements above, and
ENG 550 English Seminar 1–3
ENG 570 Practical Criticism 3
ENG 580 Seminar in Creative Writing 1–4
ENG 691 Directed Study 1–3

In consultation with his or her advisor, the student may take a maximum of 9 upper-division or graduate units in fields related to English, chiefly philosophy, history, drama, communication arts, history of art, and teacher preparation.

Graduate Course Descriptions

ENG 500 Introduction to Graduate Research (3)

Principles, techniques, and materials used in scholarly and critical writing. Bibliographical sources and methods; the writing of critical papers. Should be taken early in the student's program. Seminar, 3 hours.

ENG 550 English Seminar (1–3)

Topics in advanced areas of language or literature. Seminar, 1 to 3 hours. Prerequisite: Instructor's approval. May be repeated for a total of 9 units.

ENG 551, 552 Studies in English Literature (3) (3)

Selected authors and topics in one of the following: (A) to 1500, (B) 1500–1660, (C) 1660–1800, (D) 19th century, (E) 20th century. In the first quarter, extensive reading. In the second, explication of selected texts, long paper. May be repeated with different content for additional credit. Seminar, 3 hours.

ENG 561, 562 Studies in American Literature (3) (3)

Selected authors and topics in one of the following: (A) to 1800, (B) 19th century, (C) 20th century. In the first quarter, extensive reading. In the second, explication of selected texts. May be repeated with different content for additional credit. Seminar, 3 hours.

ENG 570 Practical Criticism (3)

Practice in applying to works of various genres such modes of criticism as the formal, the historical, and the psychological. Seminar, 3 hours.

ENG 571, 572 Studies in Fiction (3) (3)

Selected authors and topics. In the first quarter, extensive reading. In the second, explication, by students, of selected texts; long paper. First quarter or consent of instructor prerequisite to the second. Seminar, 3 hours.

ENG 573, 574 Studies in Drama (3) (3)

Selected authors and topics. In the first quarter, extensive reading. In the second, explication, by students, of selected texts; long paper. First quarter or consent of instructor prerequisite to the second. Seminar, 3 hours.

ENG 575, 576 Studies in Poetry (3) (3)

Selected authors and topics. In the first quarter, extensive reading. In the second, explication, by students, of selected texts; long paper. First quarter or consent of instructor prerequisite to the second. Seminar, 3 hours.

ENG 577, 578 Studies in Non-fictional Prose (3) (3)

Selected authors and topics. In the first quarter, extensive reading. In the second, explication, by students, of selected texts; long paper. First quarter or consent of instructor prerequisite to the second. Seminar, 3 hours.

ENG 580 Seminar in Creative Writing (1–4)

Two genres: fiction and non-fiction or poetry and drama. Seminar, 1 to 4 hours. Prerequisite: Approval of submitted manuscript or consent of instructor.

ENG 581, 582 Studies in English Language (3) (3)

Such topics as language as a cultural force, literary tradition approached linguistically, stylistics and poetics, dialects and their social context. Seminar, 3 hours.

ENG 583 The Contemporary American Novel (3)

Structure and theme in the American novel since 1945. Such writers as Bellow, Capote, Malamud, Roth, Styron, Updike. Lecture-discussion, 3 hours.

ENG 585 Problems in Teaching English as a Second Language (3)

Theory and practice in the teaching of English language skills to non-native speakers. Readings, observations, and supervised tutoring. Seminar, 3 hours.

ENG 586 Problems in Teaching High School Composition (3)

Practices in the teaching of composition in secondary schools. Readings, observations and sample teaching under supervision. Seminar, 2 hours, field work.

ENG 587 The Teaching of Basic Language Skills (3)

Approaches to the problems of high school and community college students with serious deficiencies in language skills. Lecture-discussion, 3 hours. Prerequisite: Consent of instructor.

ENG 588 Problems in Teaching College Freshman Composition (3)

The instruction of composition in the community college classroom. Readings, observations and sample teaching under supervision. Seminar, 2 hours, field work.

ENG 589 Developmental Reading in the Secondary School and Community College (3)

Theory and practice in the development of effective reading by students who have mastered basic reading skills and can be helped to enrich vocabulary, improve comprehension and increase speed. Lecture-discussion, 3 hours. Prerequisite: consent of instructor.

ENG 691 Directed Study (1-3)

Independent reading in areas of student's interest. Preparation for comprehensive examination. May be repeated twice for a maximum of 9 units.

ENG 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. The student must be enrolled in the university during the quarter in which he/she graduates.

LANDSCAPE ARCHITECTURE

MASTER OF LANDSCAPE ARCHITECTURE

In the Department of Landscape Architecture, School of Environmental Design

John T. Lyle, *Chair*

Landscape Architecture Graduate Studies Committee

Jeffrey K. Olson, *Chair and Graduate Coordinator*

Robert C. Perry, Jr. Takeo Uesugi Mark J. von Wodtke

The Department of Landscape Architecture welcomes graduate students from a variety of academic disciplines who are concerned with the shaping of our physical environment. Students learn current and advanced methods for establishing strong, well-defined, and mutually life-sustaining and enhancing relationships between people and the land. The curriculum emphasizes case study projects at scales varying from the garden to the region with frequent review, discussion, and seminar sessions.

The objectives of the graduate program encompass both a general professional educational background and advanced specialized study. Upon completion of the degree requirements the graduate should have developed:

I. An advanced level of professional expertise in ecosystematic land planning, that is, in shaping and controlling land in conformance to and in harmony with the processes of natural ecosystems (LA 512, 602, 606).

II. A basic competence in the major skills of landscape architecture and be able to function productively, though probably not yet independently, in professional practice. These skills and the courses in which they are emphasized are:
   (a) Plant materials and planting design (LA 541, 642)
   (b) Landscape construction and technology (LA 531, 532, 632)
   (c) Project design and site planning (LA 510, 512, 603)
   (d) Environmental analysis and impact prediction (LA 604)

III. An ability to make a creative and original contribution to some particular area of landscape architecture, either theoretical or practical, according to personal interest (LA 692, 695, 696).

IV. A comprehension of the literature, history, and theory of landscape architecture sufficient to communicate the concepts of the profession to others and to use as a philosophical basis for individual professional work (acquired primarily through LA 422-424, LA 521, LA 601).

To provide a foundation for professional skill development, students with degrees in nondesign disciplines take a series of prerequisite and supplementary courses designed specifically to meet their needs. The first of these (LA 509, 511, 521), which are offered during the summer quarter, must be taken by these students before proceeding with regular course work in landscape architecture. Students with degrees in unrelated disciplines will normally be required to take four quarters of preparatory courses in landscape architecture before proceeding with graduate course work. Other courses in the prerequisite and supplementary series are offered concurrently with the regular graduate sequence. Completion of the degree program will take six quarters in residence for students with bachelor's degrees in architecture or landscape architecture. The degree program will take at least seven quarters for students from related disciplines, and at least ten quarters, or three academic years for students from other backgrounds.

The Landscape Architecture Department considers its location in Southern California to be of special advantage for the study of landscape and environment. The presence of seacoast, mountain and desert terrain as well as one of the major metropolitan centers in North America offers a unique opportunity for professional study. Project sites may range throughout the southern area of California and field trips to a variety of areas and locations throughout the state are a regular aspect of the graduate program. Applicants to graduate studies in landscape architecture should anticipate frequent field trips as an essential part of their studies.

ADMISSION TO THE PROGRAM

Admission to the Master of Landscape Architecture program as an unconditionally classified graduate student requires an undergraduate grade point average of 3.0 or better. An applicant with an average between 2.5 and 3.0 will be considered for admission on a conditional basis if other qualifications can be demonstrated.

Complete applications must be received by the Graduate Studies Committee by February 1 to be considered for admission the following summer or fall quarter. Applications are accepted from students with degrees in all disciplines. Applicants who have developed skills and knowledge in areas directly applicable in landscape architecture, such as ecology, geography, or fine arts, may be given priority in selection.

Following admission, the student and an advisor will plan a program of study which lists all courses and other requirements which the student must fulfill for the degree. The curriculum specified in the program may be altered only by written petition, which shall be submitted in accordance with university regulations.

REQUIREMENTS

1. A minimum of 72 quarter units of graduate work must be completed in the graduate degree program. Prerequisite and supplementary courses are in addition to this minimum. Upper division courses in elective and minor emphasis areas must be approved by the student's advisor. A minimum grade point average of 3.0 must be maintained in all courses taken to satisfy degree requirements as well as in all graded course work attempted while in graduate standing at this university.
2. Students with undergraduate degrees in landscape architecture will take a minimum of 12 units in a minor emphasis area. This area should be related to the student's professional direction and must be approved by the graduate advisor.
3. The following courses are required for all graduate students in landscape architecture: LA 512, LA 601, LA 602, LA 604, LA 606 (12 units), LA 632 or LA 642, LA 652 (4 units), LA 691 (3 units), LA 692 (6 units), and LA 695 or 696.
4. In addition to the above, the following courses are required for students with degrees in fields other than landscape architecture: one of the following three courses in history: LA 422, LA 423 or LA 424; LA 509, LA 510, LA 511, LA 521, LA 531, LA 532, LA 541, LA 551, LA 552, LA 553, LA 603, and both LA 632 and LA 642. Additional undergraduate courses are required for students without adequate preparation for graduate study in landscape architecture.

CURRICULUM

In consultation with an advisor and in accordance with the above requirements, each student will select courses from the following list and approved electives to complete the requirements for the Master of Landscape Architecture degree.

		UNITS
LA 509	Foundations of Landscape Design	6
LA 510	Foundations of Landscape Design	6
LA 511	Design Graphics	4
LA 512	Methods and Applications for Landscape Architecture	9
LA 521	Landscape Awareness	4
LA 531	Landscape Construction and Design	6
LA 532	Landscape Construction and Design	6
LA 541	Landscape Planting	6
LA 551	Seminar on the Profession	2
LA 552	Seminar on Design Research	2
LA 553	Seminar on Professional Directions	2
LA 555	Seminar on Human Behavior in the Landscape	2
LA 575	Topics in Landscape Architecture	2
LA 601	Theory and Literature of Landscape Architecture	4
LA 602	Landscape Design and Natural Processes	6
LA 603	Landscape Design and Human Behavior	6
LA 604	Environmental Analysis	6
LA 606	Ecosystematic Landscape Design	6
LA 632	Landscape Technology	6
LA 642	Plant Ecology and Design	6
LA 652	Graduate Seminar	2
LA 691	Special Project	1
LA 692	Directed Research	1–6
LA 695	Project	4
LA 696	Thesis	4

GRADUATE COURSE DESCRIPTIONS

LA 509 Foundations of Landscape Design (6)

Principles and techniques of basic design as applied to shaping the landscape. Concepts in visual thinking, introduced and developed by means of studio exercises, and their importance in design concepts. Offered summer quarter only. Lecture-discussion—3 hours; laboratory, 9 hours.

LA 510 Foundations of Landscape Design (6)

Principles and techniques of environmental design applied to shaping the landscape; development of landscape design skills. Lecture-discussion—3 hours; laboratory, 9 hours.

LA 511 Design Graphics (4)

Techniques of graphic communication for environmental design; freehand sketching, orthogonal drafting; audio visual presentation applied to the development and presentation of design ideas and proposals. To be taken during summer quarter concurrently with LA 509 and LA 521. 2 one-hour lectures, 2 three-hour laboratories.

LA 512 Methods and Applications for Landscape Architecture (9)

Examination of concerns underlying landscape design and planning and processes for dealing with them at scales from the very small project to the region; emphasis on applied ecology, systems techniques, and environmental policy and management as well as design and planning techniques. Lecture-discussion—4 hours; laboratory, 15 hours. Prerequisite: LA 510 or degree in design discipline.

LA 521 Landscape Awareness (4)

Sensory exploration of natural and man-made environments in relation to historical and contemporary theory and philosophy of landscape architecture; discussion and analysis of contemporary movements and the various roles of the landscape architect. Lecture-discussion—3 hours; laboratory, 3 hours.

LA 531, LA 532 Landscape Construction and Design (6) (6)

Basic methods of landscape alteration, augmentation and control including grading, drainage, roads and trails, utilities, and small structures; the uses, limitations, and effects of such alterations. Lecture-discussion—3 hours; laboratory, 9 hours.

LA 541 Landscape Planting (6)

Selection of plant association for the developed landscape on the basis of culture, utility, visual character, and ecological relationships; identification, classification, and use of common plants. Lecture-discussion—3 hours; laboratory, 9 hours. Prerequisite: LA 510 or degree in design discipline or permission of instructor.

LA 551 Seminar on the Profession (2)

Analysis and discussion of the structure and organization of the profession of landscape architecture; its history and future. Case studies of professional firms and organizations in the Los Angeles region. Seminar, 2 hours.

LA 552 Seminar on Design Research (2)

Analysis and discussion of basic research methods; current research activity in the profession of landscape architecture and future research needs for the profession. Seminar, 2 hours. Prerequisite: LA 551.

LA 553 Seminar on Professional Directions (2)

Analysis and discussion of current and future activities in the profession of landscape architecture; emphasis on individual development and specialization. Seminar, 2 hours. Prerequisite: LA 552.

LA 555 Seminar on Human Behavior in the Landscape (2)

Analysis and discussion of human behavior in designed environments, methods of observation and recording of behavioral activities. Application of behavioral analysis to design. Seminar, 2 hours.

LA 575 Topics in Landscape Architecture (2)

Presentation of special topics in landscape architecture through lectures, readings and discussion. Topics selected to correspond with changes in the field or needs of advanced students. Course may be repeated for a maximum of 6 units credit. Lecture-discussion—2 hours.

LA 601 Theory and Literature of Landscape Architecture (4)

Review and analysis of the existing body of literature concerning relationships between man and the natural environment, with particular concentration on ecosystems and human needs according to the preference of the individual student. Development of bibliographic research techniques. Lecture-discussion—4 hours. Prerequisite: LA 512 or permission of instructor.

LA 602 Landscape Design and Natural Processes (6)

Application of ecosystematic principles and methods to physical problems of landscape design, encompassing a broad and complex range of human and natural considerations. Lecture-discussion—3 hours; laboratory, 9 hours. Prerequisite: LA 512.

LA 603 Landscape Design and Human Behavior (6)

Application of approaches to the determination, satisfaction and expression of human needs in the shaping of space for human use and habitation. Lecture-discussion—3 hours; laboratory, 9 hours. Prerequisite: LA 512.

LA 604 Environmental Analysis (6)

Techniques for prediction of alterations in social and natural processes brought about by human use of the land and the application of such assessments to environmental management. Lecture-discussion—3 hours; laboratory, 9 hours. Prerequisite: LA 512 or permission of instructor.

LA 606 Ecosystematic Landscape Design (6)

Application of the ecosystematic approach to complex large-scale problems of landscape design and natural resource planning. Lecture-discussion—3 hours; laboratory, 9 hours. Prerequisite: LA 602 or permission of instructor. May be repeated. Maximum credit 12 units.

LA 632 Landscape Technology (6)

Application of modern technology to landscape construction involving adaptation of the landscape for human purposes. Lecture-discussion—3 hours; laboratory, 9 hours. Prerequisite: LA 532 and LA 512 or degree in landscape architecture.

LA 642 Plant Ecology and Design (6)

Determination and establishment of appropriate communities of plants for landscapes of varied degrees of development on the basis of ecological factors; advanced methods of plant selection and combination with emphasis on native plants and communities. Lecture-discussion—3 hours; laboratory, 9 hours. Prerequisites: LA 541 and LA 512 or degree in landscape architecture.

LA 652 Graduate Seminar (2)

Seminar presentations and discussion of work in progress by all graduate students. Seminar, 2 hours. May be repeated. Maximum credit 4 units.

LA 691 Special Project (1)

Individual exploration of particular areas of concern. Each student must submit a proposal at the beginning of the quarter and a final report describing the results of this effort. Course may be repeated. Maximum credit 10 units.

LA 692 Directed Research (1-6)

Independent study and research on a subject chosen by the student with the consultation, approval, and direction of an advisor. Course may be repeated. Maximum credit, 18 units.

LA 695 Project (4)

Development of a terminal creative project designed to demonstrate skills and knowledge achieved in the graduate program. The subject will be selected by the student in consultation with an advisor. Prerequisite: LA 606.

LA 696 Thesis (4)

Development of a terminal creative research report on a problem in landscape architecture selected by the student and approved by the graduate studies committee. Prerequisite: LA 606.

LA 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which the student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. Prerequisite: Advancement to candidacy for master's degree. The student must be enrolled in the university during the quarter in which he/she graduates.

MATHEMATICS

Master of Science in Mathematics

In the Department of Mathematics, School of Science

V. Merriline Smith, *Chair*

Daniel A. Marcus, *Coordinator, Graduate Program*

The university offers the degree of Master of Science in Mathematics to provide opportunites for advanced study to students whose background and interests focus on mathematical studies. Completion of this program will develop the student's knowledge and competence in mathematics and develop his ability to pursue advanced self-directed study in this field. A central curriculum, required of all candidates, provides a foundation for the study of recent developments in mathematics. Each student's degree program beyond the requirements will be planned to further personal plans to pursue a career in applied fields of mathematics, in teaching, or in more advanced study leading to the doctorate.

Admission to the Program

An applicant for admission to this program should have completed a baccalaureate degree program in mathematics comparable to that offered at this university or a baccalaureate degree in a related field with at least 20 quarter units of upper division courses including MAT 314, MAT 315, MAT 417, MAT 418, and MAT 428 or their equivalent. Students whose undergraduate degree is in a field other than mathematics will generally find it necessary to follow a program of additional preparation before undertaking graduate work in mathematics. An upper division grade-point average in mathematics of at least 3.0 is required for admission as a classified graduate student in mathematics. Each applicant will be considered by the departmental graduate committee and recommended for admission on the basis of all evidence applicable to the student's admission. An applicant not meeting the minimum standards of the department may be admitted as a conditional student if space is available. The student must comply with the conditions of admittance within the time stipulated.

Student Program

The student's study list will be based upon undergraduate preparation, current interests in mathematics, and occupational and professional goals. During the first quarter of residence, each classified graduate student will prepare a study list in consultation with a major professor. This will define all courses and other requirements which the student must fulfill to earn the degree. Once approved by the School of Science and verified by the Graduate Dean, the study list may be amended only by petition, as outlined in the appropriate sections of this catalog.

Requirements

1. At least 45 units of acceptable graduate work must be completed in the master's degree program. At least 25 units of this credit shall be in courses at the graduate level.
2. No more than 13 units of graduate credit earned at other accredited institutions or in extension may be applied to degree requirements.
3. At least 27 units of credit toward the degree shall be completed after the student has reached unconditional classified status.
4. A grade-point average of B (3.0) or better shall be maintained in all course work taken to satisfy the degree requirements.

Curriculum

REQUIRED COURSES

		Units
MAT 511	Real Analysis	4
MAT 517	Abstract Algebra	4
*MAT 413	Advanced Calculus	4
*MAT 419	Abstract Linear Algebra	4
*MAT 429 or 528	Complex Analysis	4

A thesis or comprehensive examination is required of all candidates.

ELECTIVES

Graduate mathematics, including completion of two graduate sequences and 1 to 4 units of MAT 550 . . 17

Additional electives from 8

1. Graduate courses in mathematics
2. Senior level courses in mathematics other than MAT 417, MAT 418, or MAT 428.
3. Up to two courses from approved graduate offerings of other departments. These courses must be mathematically oriented in a technical sense.

Total 45

*If a comparable course has been completed previously, a 4-unit elective may be substituted.

Sequence Offerings (511-512, 517-518, 528-529)
MAT 511 will be offered in Fall, odd years, and in Winter, even years.
MAT 517 will be offered in Fall, even years, and in Winter, odd years.
MAT 528 will be offered in Fall, odd years.

Graduate Course Descriptions

MAT 511, 512 Real Analysis (4) (4)

Properties of Lebesgue measure and integration, Borel Sets, Monotone functions and functions of bounded variation, classical Banach spaces, metric spaces, measure spaces and measurable functions, the Radon-Nikodym theorem, the Fubini theorems, Daniel integrals. Lecture-discussion, 4 hours. Prerequisite: MAT 315.

MAT 517, 518 Abstract Algebra (4) (4)

Groups, Sylow theorems, rings and modules, chain conditions, morphism theorems, principal ideal domains, field extensions and finite fields, Galois theory. Lecture-discussion, 4 hours. Prerequisite: MAT 417.

MAT 521 Topology (4) F, even years

Topological spaces, connectedness, compactness, continuity, separation and countability axioms, metric spaces, product spaces, function spaces and quotient spaces, uniform spaces, paracompactness. Lecture-discussion, 4 hours. Prerequisite: consent of instructor.

MAT 528, 529 Complex analysis (4) (4)

General form of Cauchy's theorem, conformal mappings, normal families. Riemann mapping theorem, theorems of Mittag-Leffler and Weierstrass, analytic continuation. Picard's theorem. Selected topics such as Dirichlet's problem, generalization of Ricard's theorem, gamma and zeta functions. Lecture-discussion, 4 hours. Prerequisite: MAT 314 or 428, or consent of instructor.

MAT 535 History of Mathematics (4) SU

Historical development of selected mathematical topics drawn generally from the body of 18th Century and later mathematics. Topics to be covered announced by the professor prior to registration. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

MAT 550 Seminar in Mathematics (1-4) Sp

Topics in advanced mathematics chosen according to the interests and needs of the students enrolled. Each seminar will have a subtitle according to the nature of the content. Seminar, 1 to 4 hours. Prerequisite: Instructor's approval. May be repeated for a maximum of 8 units.

MAT 581 Graphs and Network Flows (4)

Solution of problems which may be formulated as flow problems in capacity constrained networks. Tools of network flow theory are developed using graph theoretic methods. Application to transportation networks and communication. Prerequisite: MAT 480 or consent of instructor. 4 lectures.

MAT 582 Large Scale Mathematical Programming (4)

Theory and computational procedures for decomposing large-scale mathematical programming problems. Generalized linear programming, decomposition algorithms, column generation, compact inverse methods, triangular basis factorization, generalized upper bounding methods, partitioning and relaxation methods. Prerequisite: MAT 480, or consent of instructor.

MAT 599 Special Topics for Graduate Students (1-4)

Topics to be announced in advance. Lecture-discussion, 3 to 4 hours. May be repeated for a maximum of 8 units.

MAT 600 Special Problems for Graduate Students (1-2)

Individual or group investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

MAT 691 Directed Readings (1)

Individual reading program in an area chosen by the student under the direction and supervision of the faculty. Maximum of 4 units credit.

MAT 696 Thesis (1)

Independent research and study under supervision of the faculty. Reporting of research results in an acceptable form. Maximum of 3 units credit.

MAT 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. The student must be enrolled in the university during the quarter in which he/she graduates.

STA 540 Mathematical Foundations of Probability Theory (4) W, even years

Kolmogorov's foundation for probability theory, discrete and continuous probability models, random variables, expectation, conditional probability and conditional expectation, finite and infinite dimensional probability spaces. Prerequisite: MAT 315.

STA 541 Probability Theory (4) Sp, even years

Independence, zero-one laws, laws of large numbers, convergence theorems, characteristic functions, and basic limit theorems. Prerequisite: STA 540 or consent of instructor.

STA 584 Queueing Theory (4) F, odd years

Analysis of queueing systems, discrete and continuous time Markov processes, birth and death processes, equilibrium results for single and multiple server queues, method of stages, priority queues. Prerequisites: MAT 382, and STA 331 or STA 441, or consent of instructor.

PHYSICAL EDUCATION

Master of Science in Physical Education

In the Department of Health, Physical Education, Recreation and Dance (HPERD), School of Arts

Stanley L. Bassin, *Chair*

Physical Education Graduate Committee

George Eisen, *Graduate Coordinator*

V.B. Anooshian
Stanley Bassin
Lynne Emery
Aubrey Fine
Otto F.W. Gasser
Gus Gerson
Frank D. Lansford
G. S. Don Morris
Mary Jo Oliver
Leo H. Teghtmeyer

The Master of Science in Physical Education curriculum is planned to provide the student with an opportunity to improve professional competencies within a chosen area of specialization. Experiences will be provided to enhance the analytical and critical tools for research and decision making. The student will be provided with a frame of reference that will aid in understanding today's problems in the profession.

A candidate for the master's degree in physical education will be required to choose among four areas of specialization: adapted physical education, organization and administration of physical education, the scientific bases of physical education, or the sociocultural bases of physical education. The adapted specialization is directed toward those interested in working with persons with special needs. It combines practical experience with theoretical knowledge of the handicapped population. The specialization in organization and administration of physical education is planned to prepare students for positions as athletic directors, department heads, or supervisors of health and physical education programs. The scientific specialization provides an experimental approach to problems in physical education. Objectives of the program include the preparation of students for research and advanced graduate programs. The sociocultural specialization is directed to the needs of the teacher in a school situation. It is descriptive in nature and emphasizes causes of and methods for coping with today's problems. Opportunity is provided for selection of elective courses within the department as well as from other graduate programs.

Admission to the Program

An applicant for admission to this program must have received a baccalaureate degree in physical education or a related discipline from an accredited institution. A candidate with a baccalaureate degree in a major other than physical education may be admitted subject to review of the candidate's academic background and performance by the departmental graduate studies committee.

An undergraduate grade point average of 3.0 or better, or an undergraduate grade point average of 2.5 or better with a 3.0 grade point average in all upper division work, is required for admission. An applicant not meeting these admission criteria will be reviewed by the Physical Education Graduate Committee. If the committee approves, the applicant will be admitted conditionally.

The conditions, including the time allowed for meeting them, will be stated in writing at the time the applicant is admitted to the university. One condition will be completion of PE 590, Research Methods, with a grade of A or B. All applicants must have approval of the departmental graduate studies committee.

Each selected applicant will be assigned an HPERD adviser. This assignment will be based upon the student's area of specialization and the thesis topic so that the adviser's expertise will coincide with the student's academic emphasis. The student, with an adviser, will develop a program based on the individual's interests and preparation. This program will include required core courses, area of specialization courses and appropriate elective courses. All programs will be reviewed and approved by the departmental graduate studies committee.

Requirements

1. The degree program must include a minimum of 45 quarter units, including no more than 13 acceptable units transferred from another graduate institution. No more than 18 units may be in approved upper-division courses. An overall 3.0 grade point average in all graduate work attempted is required.
2. In addition to completing 9 units of required core courses and 9 units in an area of specialization, the candidate must fulfill the terminal requirement of either a thesis or a comprehensive examination. The student shall indicate at the time of filing the program the decision as to the manner of fulfilling the terminal requirement.
3. The candidate who chooses to write a thesis must enroll for 9 units of thesis credit and present an oral defense upon completion. The student adopting the option of a comprehensive examination will be tested on material from the core and specialization area, and may elect either an oral or a written examination.

Curriculum

REQUIRED COURSES

		Units
PE 505	Problems in Physical Education	3
PE 510	Philosophical Bases of Physical Education	3
PE 590	Research Methods	3

SPECIALIZATION COURSES

Adapted Physical Education

PE 570	Administration and Supervision of Adapted Physical Education	3
PE 670	Problems in Programs for the Atypical	3

One of the following courses:

PE 580	Motor Learning and Human Performance	3
PE 583	Motor Development	3

Organization and Administration of Physical Education

PE 550	Problems in Administration in Physical Education	3
PE 553	Curriculum Development in Physical Education	3
PE 653	Supervision of Physical Education	3

Scientific Bases of Physical Education

3 of the following courses:

PE 580	Motor Learning and Human Performance	3
PE 583	Motor Development	3
PE 680	Kinesiological Analysis	3
PE 683	Physiology of Exercise	3

Sociocultural Bases of Physical Education

3 of the following courses:

PE 540	Sociology of Sport and Physical Education	3
PE 541	Play, Games and Sport in Culture	3
PE 543	World History of Physical Education	3
PE 545	Comparative Physical Education and Sport	3
PE 548	Sport Psychology	3

ELECTIVES

Elective courses to complete the required minimum of 45 units must be selected. Electives must have approval of the student's adviser.

A list of electives, which includes upper-division and graduate courses in related disciplines is available in the adviser's office.

Graduate Course Descriptions

PE 505 Problems in Physical Education (3)

Recent developments in physical education, relations with other social and educational agencies, curriculum changes, professional organizations, individual and group problem solving. Seminar, 3 hours.

PE 510 Philosophical Bases of Physical Education (3)

The development of the philosophies of physical education and the assumptions upon which current professional philosophies rest. Lecture-discussion, 3 hours.

PE 540 Sociology of Sport and Physical Education (3)

Preparation and presentation of critical reviews of literature in sociology of sport. The topics to be considered are: the impact of sport on industry, economics, and the institutions of politics and education; sport as it affects man's sociocultural development and his value system. Lecture-discussion, 3 hours. *Dr. Eisen.*

PE 541 Play, Games and Sport in Culture (3)

Theoretical approaches to the analysis of play, games, and sport. Critical analysis of variations among and within cultures from anthropological and psychosocial perspectives. Lecture-discussion, 3 hours. *Dr. Eisen.*

PE 543 World History of Physical Education (3)

The development of physical education from ancient times to the present in both Eastern and Western cultures. Emphasis on the growth and development of physical education in Greece and Rome. Lecture-discussion, 3 hours. *Dr. Emery*

PE 545 Comparative Physical Education and Sports (3)

Examination and analysis of similarities and differences of physical activities in developed and developing countries. Cultural, educational, and historical backgrounds of contemporary physical education and sport programs. Lecture-discussion, 3 hours. *Dr. Emery.*

PE 548 Sport Psychology (3)

Personal characteristics of athletes, coaches, and various sports environs in relation to athletic participation, performance, and learning. Lecture-discussion, 3 hours.

PE 550 Problems in Administration of Physical Education (3)

Study and critical analysis of theories and philosophies relating to administrative situations. Effective evaluation with reference to interrelated conditions, decision-making, and developing an integrated way of behaving while implementing decisions. Lecture-discussion, 3 hours. Prerequisite: PE 420.

PE 553 Curriculum Development in Physical Education (3)

Basic considerations and problems of physical education curricula in secondary schools. Lecture-discussion, 3 hours. *Dr. Oliver.*

PE 554 Administration of Athletic Programs (3)

Administrative skills and expanded concepts for effecting change. Budgets, personnel, equipment and facilities, publicity, and legislation related to the athletic director's responsibilities. Lecture-discussion, 3 hours.

PE 560 Theory of Modern Dance (3)

The kinesiological basis of ballet and modern dance technique. The development of sensory, motor, and spatial awareness as an outgrowth of technical developments. Examination of selected movement forms and application to modern dance technique. Lecture-discussion, 3 hours.

PE 565 Analysis of Ethnic Dance (3)

Ethnic dance from Africa, Europe, or the Middle or Far East. Dance forms of the area, cultural aspects, and techniques of choreography for performance. Lecture-discussion, 2 hours, activity, 2 hours. Prerequisite: permission of instructor. May be repeated for credit.

PE 570 Administration and Supervision of Adapted Physical Education (3)

Study of methods and problems encountered in administration and supervision of APE programs. Designed for the APE specialist, consultant, or other administrative and supervisory positions in schools, DCH facilities, and nursing homes. Lecture-discussion, 3 hours.

PE 575 Advanced Field Work in Adaptive Physical Education (3)

Supervised clinical type experience in APE at selected public and private agencies. May be taken a maximum of 3 times for credit. 6 hours fieldwork.

PE 580 Motor Learning and Human Performance (3)

Preparation and presentation of critical reviews of literature in motor learning. Topics are: kinesthesis, reaction time, strength in neuromotor coordination, motor learning, and transfer factors affecting motor performance. Lecture-discussion, 3 hours. *Dr. Bassin.*

PE 583 Motor Development (3)

Analysis of physical growth and motor development from infancy to adulthood. Changes in anthropometric measurements, rates of growth of various body tissues, organs, and segments, and ossification of the skeleton during childhood and adolescence. Aspects of motor development at various ages. Lecture-discussion, 3 hours. Prerequisite: PE 312 or 430.

PE 585 Scientific Bases of Physical Education (3)

The scientific foundations for physical education and athletic programs; application of principles from exercise physiology, kinesiology, and motor learning. For students with minimal scientific background. Lecture-discussion, 3 hours. Prerequisite: permission of instructor. *Dr. Teghtmeyer.*

PE 590 Research Methods and Design (3)

Advanced evaluation of experimental design, instrumentation procedures and analysis of factors relating to human performance. Lecture-discussion, 3 hours. Prerequisite: PE 425 and a course in basic statistics, or the equivalent.

PE 645 The Behavorial Sciences of Human Movement (3)

Preparation and presentation of critical reviews of current research literature in behavioral science of physical education leading to an understanding of the research process and applying techniques to the solution of specific problems. Seminar, 3 hours.

PE 653 Supervision of Physical Education (3)

Emerging concepts and principles of physical education supervision; application to situations in which administrators, supervisors, coordinators, and teachers are working. Lecture-discussion, 3 hours. Prerequisite: PE 420.

PE 655 Legal Aspects of Health, Physical Education, Recreation, and Athletics (3)

Legal theory relating to health, physical education, recreation, and athletics; legislation, court decisions, and legal procedures affecting these fields. Lecture-discussion, 3 hours. Prerequisite: permission of instructor. *Dr. Lansford.*

PE 670 Problems in Programs for the Atypical (3)

Problems in developing programs for the atypical performer. Recent literature, research, and experimentation with programs for the atypical performer. Seminar, 3 hours. Prerequisite: PE 570 or permission of instructor.

PE 680 Kinesiological Analysis (3)

Advanced kinesiological analysis utilizing knowledge of muscle groups and principles of movement and human performance to develop a logical and cohesive understanding of human movement. Lecture-discussion, 3 hours. Prerequisite: PE 302. *Dr. Gasser.*

PE 683 Physiology of Exercise (3)

The physiological adjustments made by the body during exercise and changes which result from prolonged periods of intensive physical training. Critical analysis of training programs. Lecture-discussion, 3 hours. Prerequisite: PE 303. *Dr. Teghtmeyer.*

PE 691 Independent Study (2)

Independent study in an area chosen by the student under the direction and supervision of faculty. May not be repeated more than once.

PE 696 Thesis (3)

Development of a terminal creative research report on a topic selected by the student, approved by the department graduate studies committee and submitted to the faculty as evidence of his/her mastery of the principles of the profession. May be scheduled for a maximum of 9 units.

PE 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. The student must be enrolled in the university during the quarter in which he/she graduates.

URBAN AND REGIONAL PLANNING

Master of Urban Planning

In the Department of Urban and Regional Planning, School of Environmental Design

_____, *Chair*

Urban Planning Graduate Studies Committee

David E. Bess, *Chair*

Harry A. Anthony Sherman W. Griselle Margarita P. McCoy

William R. Dale

Graduate study in the Department of Urban and Regional Planning leads to the degree Master of Urban Planning. The two-year curriculum is designed to provide instruction combined with supporting studies, seminars, and studio projects integrated with field work. Both the theoretical and the applied aspects of urban planning are pursued. The work is directed toward competent professional development and prepares the student to meet present and probable future needs of the planning profession. Most graduate planning courses are offered in the late afternoon and evening to accommodate working professionals. Students may also take courses on a part-time basis. Holders of the Master of Urban Planning degree will be qualified for employment in city, county, regional, and state planning departments; national planning, housing, and urban development agencies; other public organizations, foundations, industries, and private architectural, engineering, and planning consulting firms. They will also be able to work as urban planning consultants in the public and private sector following prerequisite work experience; teach urban planning at community college, college, and agency levels (in-service training programs) following some additional preparation and practical experience; and undertake further post-graduate study leading to a doctoral degree.

The Master of Urban Planning degree program has received recognition by the American Planning Association.

Admission to the Program

An undergraduate grade point average of 3.0 or better, or an undergraduate grade point average of 2.5 or better with satisfactory performance on the aptitude test of the Graduate Record Examination is required for admission to the degree program.

A bachelor's degree in urban planning (or city and regional planning) is good preparation for this program of graduate studies. However, an applicant with a bachelor's degree in another discipline is equally welcome. It is advisable, but not required, for students to have had some background in graphics or design. Students without a background in design or graphics will be required to take preparatory work in UP 508, UP 509 and UP 510.

Following admission, the student and the Graduate Advisor prepare a program which specifies all courses and other requirements which the student must fulfill to earn the master's degree. Each student's detailed program is composed to fit individual needs and professional goals. Selection of all elective courses must be approved by the Graduate Advisor.

Urban Planning Courses taken by Unclassified Students

Courses taken in no-objective post-baccalaureate standing (graduate student coding 3100) will be accepted in fulfillment of degree requirements only if the Department and Graduate Advisor accept them in an advanced program.

Such work taken when the student is not enrolled in a program must average "B" or better with no grades below "C", if the student wishes consideration for classified status for an advanced degree.

The Urban Planning Department may deny enrollment in graduate-level courses to no-objective post-baccalaureate students if such enrollment will prevent degree objective students from meeting requirements or may hamper their progress toward the master's degree.

Requirements

Seventy-two quarter units of graduate work must normally be completed in the graduate degree program. Certain courses may be adjusted by the departmental Graduate Studies Committee based either on a special examination or on an evaluation of the student's prior education and/or professional experience.

No course below the 400 level will be accepted for graduate credit. A grade point average of "B" or better must be maintained in all graded course work attempted on graduate standing at this university and in all courses used to satisfy degree requirements. Students must maintain a "B" average in all required urban planning courses taken at this university; although a maximum of eight units in such required urban planning courses with the grade of "C" may be accepted for credit.

Satisfactory completion of a thesis or a terminal project is required. It is normally completed in two consecutive quarters. Where special conditions exist, permission may be granted allowing completion in three quarters. At the discretion of the Graduate Studies Committee, an oral examination on the content of the thesis or project report may be required.

Curriculum

REQUIRED COURSES

		Units
*UP 410	Evolution of Cities	
	or	
*UP 411	Evolution of Cities and of Planning in America	4
*UP 431	Gen Plan Survey	5
*UP 432	Gen Plan Develop	5
*UP 465	Urb Plan Imple	4
UP 511	Urb Plan Theory & Pract	4
UP 512	Urb Plan Theory & Pract	3
UP 534	Urb Hous & Comm Dev	4
UP 535	Urban Research Methods and Techniques	4
UP 536	Urb Trans & Circ Syst	4
UP 537	Reg, St Nat'l Planning	4
UP 605	Urban Design	6
UP 651	Soc & Pol Plng Pol	4
UP 652	Plng Adm & Prof Prac	4
UP 689	Urban Data & Sim Program	4
UP 695	Project or	
UP 696	Thesis	6
Electives		7
Total		72

Students whose undergraduate preparation in graphic and design skills is judged inadequate will take UP 508, UP 509, UP 510 (2) (2) (2) in addition to the 72 units of required courses.

* Students with a bachelor's degree in urban planning (or city and/or regional planning) may substitute another course for credit in lieu of the asterisked items, subject to consultation and approval of the Graduate Coordinator.

ELECTIVES

Elective courses to complete the required minimum of 72 units may be selected from any 400-, 500-, or 600-level course in any department of this university with the approval of the Graduate Advisor. The student should select a group of electives that will help either to specialize in one area (e.g., urban design, social planning, housing and community development, urban economics, planning administration) or to broaden the student's background and acquire a wider area of competence. A list of recommended electives, grouped by specialization, is available at the department office.

Graduate Course Descriptions

UP 508 Urban Planning Graphics (2)

For graduate students with degrees in fields other than environmental design to develop fundamental skills in urban planning graphics and basic design. 1 hour lecture-discussion, 3 hours laboratory. Prerequisite: Graduate status.

UP 509 Urban Design and Graphics (2)

Introduction to urban design and related skills and knowledge. Practical design problems related to physical, economic and social design parameters. Small-scale projects in site planning for individual community facilities and private land development. 1 hour lecture-discussion, 3 hours laboratory. Prerequisite: UP 508.

UP 510 Urban Design Practice (2)

Practical design problems involving large-scale housing projects, urban development and re-development, shopping centers, urban spaces, and related economic and legal concerns. 1 hour lecture-discussion, 3 hours laboratory. Prerequisite: UP 509.

UP 511 Urban Planning Theory and Practice (4)

Theoretical concepts used in plan formulation. Study of planning processes as the synthesis of social, economic, environmental and political components. Theories in planning (substantive theory) and theories of planning (procedural theory). Relationship of planning and implementation strategies to political styles and contexts for effective action. 2 hours lecture, 2 hours seminar.

UP 512 Urban Planning Theory and Practice (3)

Planning as a scientific endeavor. Developing research methodologies for application to planning problems. Information analysis for evaluation of plan alternatives. Decision theory. Concepts of information resources in relation to the role of the planner and the general planning process. Case studies. 3 hours seminar. Prerequisite: UP 511.

UP 534 Urban Housing and Community Development (4)

Housing requirements and prospects; local, state, and federal housing and community development policies; alternative solutions to housing problems. Lecture-discussion, 3 hours, laboratory, 3 hours.

UP 535 Urban Research Methods and Techniques (4)

Introduction to use of probability and statistics in urban planning research. Basic planning techniques; data analysis and display; projection techniques; land use surveys and coding; simple models; economic base and locational analysis; electronic data processing. 3 hours lecture, 3 hours lab.

UP 536 Urban Transportation and Circulation Systems (4)

Problems of planning for urban transportation and circulation facilities. Interrelationship of these systems with land use; future requirements. Public and private responsibilities. Lecture-discussion, 3 hours, laboratory, 3 hours.

UP 537 Regional, State, and National Planning (4)

Theory and methodology of regional planning; land use and resource plans and regulations; policy planning, political influences; creation of new institutions and agencies to guide change; planning for developing regions and countries; the future of regional, state, and national planning. Lecture-discussion, 3 hours, laboratory, 3 hours.

UP 605 Urban Design (6)

Urban design studies in urban planning with emphasis on contextual relationships and physical-spatial design issues. Jointly conducted with the Department of Architecture. Lecture, 3 hours; laboratory, 9 hours. Prerequisites: UP 432, UP 512.

UP 606 Urban Design (8)

Urban design studies conducted jointly with the Department of Architecture. Lecture, 5 hours; laboratory, 9 hours. Prerequisite: UP 605, and permission of the instructor.

UP 607 Urban Design (8)

Urban design studies conducted jointly with the Department of Architecture. Lecture, 5 hours; laboratory, 9 hours. Prerequisite: UP 606, and permission of the instructor.

UP 651 Social and Political Planning Policy (4)

Survey of contemporary urban conditions from a social policy perspective. Basic principles and practices of contemporary social policy planning. Methods by which urban social trends are analyzed, social indicators developed and applied to program development and analysis. Established social, economic and political institutional considerations, centralized and decentralized social policy-decision models. 4 hours lecture-discussion. Prerequisite: UP 511.

UP 652 Planning Administration and Professional Practice (4)

Administration of planning agencies; development and administration of planning and community development programs; the place of planning in local government organization and structure; function of the professional planner in public and private practice; professional ethics and responsibilities. Lecture-discussion 4 hours. Prerequisite: UP 511 and 512.

UP 689 Urban Data and Simulation Programs (4)

Survey of planning analysis techniques and use of computers. Mathematical models related to land use and population projection. Application of these techniques in the solution of research problems. Research design and program management. 3 hours lecture, 3 hours lab. Prerequisite: UP 535.

UP 691 Directed Study (1-2)

Individual reading program in an area chosen by the student or study of an urban planning problem selected by the student and investigated under the direction of a graduate faculty member. May be repeated to a maximum of 4 units of credit.

UP 695 Project (1-3)

Development of a terminal research and/or design project on a topic selected by the student, approved by the graduate studies committee, and submitted to the faculty in acceptable form. Maximum credit, 9 units.

UP 696 Thesis (3)

Development of a terminal research report on a topic selected by the student, approved by the graduate studies committee and submitted to the faculty in acceptable form. Maximum credit, 9 units.

UP 699 Master's Degree Continuation (0)

Registration required in any quarter following final assignment of SP in continuing work in which student intends to use facilities of the university. Registration permitted instead of leave of absence when student plans to use university facilities. The student must be enrolled in the university during the quarter in which he/she graduates.

ADMINISTRATIVE DIRECTORY

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University Director of Affirmative Action Services	*Glenda M. Morris*
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Dean, School of Environmental Design	Marvin J. Malecha
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Associate Dean of Instruction	David L. Clark
Dean of Continuing Education	Wayne Williams
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El Patio University Bookstore	Ernest G. Kawai
University Dean for Programs and Planning	*Kenneth H. Anderson*
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FACULTY AND SUPPORT STAFF DIRECTORY

LaBOUNTY, HUGH O., (1953) *President, Professor, History, Social Sciences*
B.A., M.A., Univ. of Redlands, 1951; Ed.D., UCLA, 1960.

ABEGG, VICTOR P. (1976) *Associate Professor, Chair, Chemistry*
A.B., Loyola Univ., 1967; Ph.D., MIT, 1970; M.Div., Toronto School of Theology, 1973.

ABERNETHY, JOHN (1969) *Professor, Chemistry*
B.A., UCLA, 1936; M.S., Northwestern Univ., 1938; Ph.D., 1940.

ABU-HAYDAR, LAURE I. (1960) *Professor, Mathematics*
B.A., American Univ., Beirut, 1948; Mathématiques Générales, Univ. de Lyon, 1951; M.A., USC, 1956.

ADAMS, KEITH (1982) *Assistant Professor, Animal Science*
B.S., Brigham Young Univ., 1975; M.S., Texas A & M Univ., 1977; Ph.D., Univ. of Illinois, 1982.

ADEE, DONALD D. (1971) *Director of College and School Relations, Professor, Physical Education*
B.S., Kansas State Univ., 1942; M.Ed. Univ. of Minn., 1948; Ph.D., 1953.

ADLER, JILL P. (1974) *Professor, Biological Sciences*
B.A., Douglas Coll., 1968; Ph.D., Cornell Medical Coll., 1974.

ALDINGTON, THOMAS (1981) *Associate Professor, Engineering Technology*
B.S.M.E., Lafayette College, 1948; M.A.E., Chrysler Institute, 1950.

ALLEN, T. HARRELL (1982) *Professor, Chair, Communication Arts*
B.A., University of Texas, 1965; M.A., West Virginia University, 1967; Ph.D., Ohio State University, 1973.

AL-SAADI, MOHAMMED A. (1969) *Professor, Political Science*
B.A., M.A., Univ. of Mont., 1961; Ph.D., Univ. of Mass., 1968.

AL-SABEA, TAHA H. (1968) *Professor, Economics*
B.A., Baghdad Univ., 1960; M.A., Mont. State Univ., 1963; Ph.D., USC, 1968.

AMBROSON, DONALD A. (1975) *Associate Professor, Chair, Music*
B.M.E., Morningside Coll., 1966; M.A., Claremont Grad. School, 1972; D.M.A., USC, 1977.

AMELIN, CHARLES F. (1969) *Professor, Mathematics*
A.B., Holy Cross, 1964; M.A., UC Berkeley, 1967, Ph.D., 1972.

AMES, RALPH W. (1961) *Dean, School of Science; Professor, Biological Sciences*
B.S., Univ. of Wyo., 1939; M.S., 1940; Ph.D., Univ. of Ill., 1950.

AMOURGIS, SPYROS (1975) *Professor, Architecture*
Certificate/Diploma Arch., The Polytechnic, London, 1960, 1963; Certificate in Urban Design, National Tech. Univ., Athens, 1966.

ANDERSON, BARBARA J. (1974) *Associate Professor, HPERD*
B.A., San Jose State Univ., 1967; M.Ed., Penn State Univ., 1971.

ANDERSON, DONALD M. (1981) *Associate Professor, Aerospace Engineering*
B.S., McPherson College, 1951; M.S., Kansas State Univ., 1954; Ph.D., Queens Univ., 1972.

ANDERSON, JUDITH I. (1976) *Associate Professor, Social Sciences*
B.A., Univ. of Michigan, 1961; M.A., San Francisco State Univ., 1968; Ph.D., UCLA, 1973.

ANDERSON, KENNETH H. (1963) *University Dean for Programs and Planning, Professor, Chemistry*
B.S., Brigham Young Univ., 1953; M.S., 1955, Ph.D., USC, 1963.

ANOOSHIAN, V. BARNEY (1958) *Professor, HPERD*
A.B., San Jose State Univ., 1947; M.A., Claremont Grad. School, 1960; Ed.D., Northern Colo. Univ., 1970.

ANTHONY, HARRY ANTONIADES (1972) *Professor, Urban Planning*
B.Arch., National Tech. Univ., Athens, 1945; MCP, Univ. de Paris, 1947; Docteur d'Université, Sorbonne, 1949; Ph.D., Columbia Univ., 1955.

ANTHONY, KATHRYN H. (1981) *Associate Professor, Architecture*
A.B., 1976, Ph.D., 1981, University of California, Berkeley.

ARMENTROUT, VIVIENNE N. (1977) *Associate Professor, Biological Sciences*
B.A., Park College, 1965; M.A., Univ. of Arkansas, 1967; Ph.D., Univ. of Wisconsin, 1976.

ARMSTRONG, ROY A. (1972) *Professor, Teacher Preparation Center*
B.A., Univ. of Ariz., 1960; M.Ed., 1961; Ph.D., 1972.

ARNOLD, KEITH E. (1981) *Assistant Professor, Biological Sciences*
B.A., California State Univ., Fullerton, 1973; M.A., 1975; Ph.D., Univ. of California, Irvine, 1980.

ASBELL, CHARLES W. (1978) *Associate Dean, School of Agriculture; Associate Professor, Agronomy.*
B.S., Oregon State Univ., 1957; M.S., UC Riverside, 1966; Ph.D., 1976.
ASELTINE, DANIEL L. (1975) *Assistant Admissions Officer*
B.A., Univ. of San Francisco, 1974; M.A., Occidental College, 1975.
ATHEY, THOMAS H. (1970) *Professor, Computer Information Systems*
B.S., Utah State Univ., 1960; M.S., U.S. Naval Postgrad. School, 1966; D.B.A., USC, 1976.
AUGARTEN, MAE (1974) *Job Developer, The Career Center; Placement Interviewer*
BACHELLER, JOHN D. (1976) *Director, Student Development*
B.S., Florida State Univ., 1958; M.S., 1959.
BAKER, REX O. (1976) *Professor, Plant & Soil Science*
B.S., Cal State Poly Univ., Pomona, 1962.
BALACHANDRAN, SAROJINI (1982) *Sr. Assistant Librarian, Reference Department*
B.S., Physics, Math, Chemistry, Univ. of Madras, India, 1954; M.A., Physics, 1958; M.S., Physics, Indiana St. Univ., Terre Haute, IN, 1970; M.S.L.S., Univ. of Illinois, Urbana, 1972.
BAPTISTE, MAXINE (1977) *Counselor*
B.A., Wash. State Univ., 1973; M.S., Wichita State Univ., 1974.
BARLET, ROBERT L. (1969) *Professor, Biological Sciences*
B.S., Loyola Univ., 1950; M.S., USC, 1958; Ph.D. 1970.
BARNES, EDWIN A., III (1981) *Assistant Professor, Plant and Soil Science*
B.S., Cal Poly, San Luis Obispo, 1976; M.S., University of Hawaii, 1978; Ph.D., University of Hawaii, 1981.
BARSELLOTTI, DOLORES A. (1972) *Director, PPS; Associate Professor, Marketing Management*
B.S., Cal State Poly Univ., Pomona, 1968; M.B.A., 1972; M.A., 1976, Claremont Grad. School, Ph.D., 1978.
BASKIN, JONATHAN N. (1971) *Professor, Biological Sciences*
B.A., Harvard Univ., 1961; M.S., Univ. of Miami, 1964; Ph.D., City Univ. of N.Y., 1972.
BASSIN, STANLEY L. (1969) *Professor, Chair, HPERD*
B.S., Univ. of Ariz., 1962; M.S., UCLA, 1966; Ed.D., UC Berkeley, 1969.
BATH, JACK L. (1974) *Professor, Biological Sciences*
B.S., UC Davis, 1961; M.S., Cornell Univ., 1964; Ph.D., UC Riverside, 1974.
BAUCH, KLAUS D. (1978) *Associate Professor, Industrial and Manufacturing Engineering*
B.S.M.E., Zwickau Sch. of Engr., 1960; M.Ed., Bowling Green State Univ., 1972; D.Ed., Texas A & M Univ., 1976; C.Mfg.E., 1979.
BEARDMORE, ROBERT L. (1958) *Professor, Mechanical Engineering*
B.S.M.E., Univ. of Ill., 1951; M.S.M.E., 1952; Engineer's Degree, Stanford Univ. 1969; P.E.
BEAUCHAMP, PHILIP S. (1981) *Assistant Professor, Chemistry*
B.A., UC San Diego, 1971; M.S., Cal Poly, 1977; Ph.D., UC Irvine, 1981.
BEILBY, RUBY (1972) *Professor, Chair, Foods and Nutrition & Home Economics*
B.S., Univ. of Washington, 1958; M.A., Cal State Univ., Los Angeles, 1970.
BELCHER, MELVIN B. (1958) *Director, International Programs in Agriculture*
B.S.E.E., UC Berkeley, 1951; M.S.E.E., USC, 1969.
BELL, DONALD L. (1972) *Associate Professor, Computer Information Systems*
B.S., Cal State Poly Univ., Pomona, 1968; Claremont Grad. Sch., M.B.E. 1972, Ph.D., 1977.
BELL, JAMES (1968) *Vice President for Administration and Student Affairs, Professor Physical Education*
A.B., Lincoln Univ., 1952; M.A., Columbia Univ., 1953; Ed.D., 1960.
BELLMAN, SAMUEL I. (1957) *Professor, English and Foreign Languages*
B.A., Univ. of Texas, 1947; M.A., Wayne State Univ., 1951; Ph.D., Ohio State Univ., 1955.
BENTIVEGNA, ANGELO (1980) *Professor, Chair, Hotel, Restaurant, and Travel Management*
B.S., Pennsylvania State Univ., 1957; M.S., Drexel Univ., 1969; D.Ed., Pennsylvania State Univ., 1974.
BERDINE, WILLIAM R. (1976) *Professor, Marketing Management*
B.F.A., Ohio University, 1966; MBA, 1967; Ph.D., 1971.
BERG, LEO W. (1970) *Professor, English and Foreign Languages*
Teacher's Diploma, Paedagogische Hochschule, Germany, 1959; Conductor's Diploma, Musikhochschule, Germany, 1960; B.A., UCLA, 1966; M.A., UC Riverside, 1968; Ph.D., 1971.
BERGSTROM, RICHARD J. (1970) *Professor, Finance, Real Estate and Law*
B.S., Southwest Mo. State, 1966; J.D., Univ. of Mo., Kansas City, 1970.

BERKOWITZ, LEONARD (1969) *Professor, Mechanical Engineering*
B.M.E., The Cooper Union, 1953; M.S.M.E., USC, 1958.
BERNE, JOHN R. (1960) *Counselor*
B.S., USC, 1958.
BERNICK, ROBERT L. (1979) *Associate Professor, Electrical and Computer Engineering*
B.A., Univ. of Minn., 1959; M.A., UC Berkeley, 1962; Ph.D., USC, 1969.
BESS, DAVID E. (1967) *Professor, Urban Planning*
A.B., Stanford Univ., 1959; M.C.P., UC Berkeley, 1967; Ph.D., Claremont Grad. School, 1977.
BET-PERA, FREDRICK (1982) *Associate Professor, Chemistry*
B.S., Nat. Univ. of Iran, 1972; Ph.D., Loyola Univ. of Chicago, 1981.
BIDDLE, JOHN (1971) *Professor, Mechanical Engineering*
B.S.M.E., Wash. Univ., 1964; M.S.M.E., 1966, Ph.D., Arizona State Univ., 1971.
BIRNBAUM, SIDNEY (1970) *Professor, Mathematics*
B.A., N.Y., Univ., 1948; M.S., 1959; Ph.D., Univ. of Colo., 1965.
BLACKBURN, THOMAS C. (1965) *Professor, Social Sciences*
B.A., Univ. of Hawaii, 1959; Ph.D., UCLA, 1974.
BLACKMAN, SONIA L. (1980) *Assistant Professor, Behavioral Sciences*
B.A., Florida State University, 1976; M.A., UC Riverside, 1978; Ph.D., UC Riverside, 1980.
BLAKELY, LAWRENCE M. (1963) *Professor, Biological Sciences*
B.A., Univ. of Mont., 1956; M.A., 1958; Ph.D., Cornell Univ., 1963.
BLUMNER, SIDNEY M. (1967) *Professor, Economics*
B.A., UCLA, 1960; M.A., 1961; Ph.D., Univ. of Ariz., 1968.
BOCHKOR, STEPHEN (1971) *Professor, Landscape Architecture*
B.S.L.A., Syracuse Univ., 1951; M.L.A., Harvard Univ., 1955.
BOGUE, CAMERON C. (1955) *Professor, Mathematics*
B.A., Univ. of Redlands, 1943; M.A., Univ. of Michigan, 1947.
BOROWICK, JEROME N. (1981) *Associate Professor, Civil Engineering*
B.C.E., City College of New York, 1962; M.S., New York Univ., 1965.
BOWEN, CHARLES E. (1969) *Professor, Chemistry*
A.B., San Jose State Univ., 1959; B.S., 1965; M.S., 1965; Ph.D., UC Davis, 1969.
BOWEN, RUTH J. (1968) *Professor, Chemistry*
B.S., Glensville State Coll., 1963; Ph.D., West Va. Univ., 1968.
BRADLEY, ROBERT C. (1969) *Test Officer, Counseling Center*
B.A., Azusa Pacific, 1960; M.A., Cal State Univ., Los Angeles, 1968; Ph.D., USC, 1976.
BRAY, ROBERT S. (1980) *Professor, Chemical and Materials Engineering*
B.E., Yale Univ., 1953; M.E., 1954.
BRAY, ROBERT T. (1965) *Professor, Economics*
B.S., Penn State Univ., 1957; M.A., 1960; Ph.D., UCLA, 1972.
BREYER, DONALD E. (1969) *Professor, Engineering Technology*
B.S., Cal State Poly Univ., Pomona, 1966; M.E., UC Berkeley, 1969, P.E.
BRIGHT, BRATCHER L. (1964) *Professor, Industrial and Manufacturing Engineering*
B.S., Buffalo State Univ., 1960; M.A., Colo. State Univ., 1961.
BRIZOLIS, DEMETRIOS (1972) *Associate Professor, Mathematics*
A.B., UCLA, 1968; M.A., 1969; Ph.D., 1972.
BROWN, DAVID (1976) *Associate Professor, Chemistry*
B.S., University of Penn., 1968; Ph.D., UCLA, 1976.
BROWN, HOWARD S. (1948) *Professor, Biological Sciences*
B.A., UCLA, 1943; M.A., 1949; Ph.D., Claremont Grad. School, 1960.
BROWN, KEITH H. (1968) *Professor, Physics*
B.A., Brigham Young Univ., 1964; M.S., Univ. of Ill., 1965; Ph.D., Brigham Young Univ., 1969.
BROWN, WAYNE C. (1973) *Associate Professor, Behavioral Sciences*
A.B., UC Riverside, 1971; M.A., 1971; Ph.D., 1977.
BROWNE, PHILIP R. (1963) *Professor, Music*
B.A., Ariz. State Univ., 1956; M.M., Eastman School of Music, 1959.
BRUCKMAN, JOHN C. (1977) *Professor, Management and Human Resources*
B.S., San Jose State Univ., 1967; M.A., Occidental College, 1969; M.B.A., USC, 1969; Ph.D., Wright Institute, 1976.
BRUM, GILBERT D. (1975) *Associate Professor, Biological Sciences*
B.A., Calif. State Univ., Los Angeles, 1970; M.A., UC Riverside, 1972; Ph.D., 1975.

BRUNDAGE, ANTHONY L. (1968) *Professor, History*
B.A., UCLA, 1964; M.A., 1966; Ph.D., 1970.
BRUNS, ROBERT A. (1966) *Professor, Electrical and Computer Engineering*
B.S., M.S., Ore. State Univ., 1942; P.E.
BUHR, JOHN S. (1975) *Associate Professor, Engineering Technology*
B.S., West Coast Univ., 1966; M.S., 1975.
BURDICK, THOMAS A. (1962) *Professor, Communication Arts*
B.A., Cal State Univ., Long Beach, 1955; M.A., 1956.
BURNS, SUSAN M. (1982) *Assistant Professor, Music*
B.M., Arizona State Univ., 1969; M.M., USC, 1970.
BURRILL, MELINDA (1976) *Associate Professor, Animal Science*
B.S., Univ. of Arizona, 1969; Ph.D., Ore. State Univ., 1974.
BUSH, ROBERT T. (1971) *Professor, Physics*
B.S., Mich. State Univ., 1959; M.A., UC Berkeley, 1962; Ph.D., Northwestern Univ., 1971.
BUSCHAUER, ROBERT G. (1980) *Assistant Professor, Physics*
B.S., Cal Poly, Pomona, 1969; M.A., UC Irvine, 1973; Ph.D., UC Irvine, 1978.
CABACUNGAN, EDISON I. (1975) *Professor, Agricultural Business Management*
B.S., Central Luzon State Univ., 1959; M.S., Virginia Polytechnic Institute, 1966; Ph.D., 1969.
CABACUNGAN, NENITA B. (1972) *Associate Professor, Foods and Nutrition & Home Economics*
B.S., Central Luzon State Univ., 1959; M.S., Virginia Polytechnic Inst., 1968; Ph.D, Colo. State Univ., 1972.
CALDWELL, KARA F. (1974) *Associate Professor, Foods and Nutrition & Home Economics*
B.S., Cal State Poly Univ., Pomona, 1969; M.S., UCLA, 1972; D.H. Sc., Loma Linda Univ., 1977.
CAMP, RICHARD G., JR. (1981) *Associate Professor, Engineering Technology*
B.S.M.E., Colorado State Univ., 1950.
CAMPBELL, DAVID P. (1975) *Associate Professor, Biological Sciences*
B.A., Western Washington State Coll., 1967; Ph.D., Washington State Univ., 1976.
CARLIN, SIDNEY (1969) *Professor, Behavioral Sciences*
A.B., UC Berkeley, 1951; M.A., USC, 1961; Ph.D., 1968.
CARLYLE, RONALD L. (1973) *Professor, Civil Engineering*
B.S., Univ. of Toronto, 1962; B.S.A.E., Poly. Inst. Brooklyn, 1965; M.S.A.M., USC, 1971; Engr., 1973; Ph.D., 1974; P.E.
CARNEY, MICHAEL (1981) *Associate Professor, Finance, Real Estate and Law*
B.A., UCLA, 1966; M.A., 1969; Ph.D., 1981.
CARTER, JOEL W. (1968) *Professor, Chair, Ornamental Horticulture*
B.S., Florida State Univ., 1954; M.S., Univ. of Tenn., 1955; Ph.D. Texas A & M, 1980.
CARTER, WILLIAM G. (1971) *Associate Professor, Music*
B.A., UCLA, 1967; M.A., 1971.
CASTLEMAN, JACOB I. (1969) *Associate Professor, Electrical and Computer Engineering*
B.S., M.I.T., 1935; M.S., N.Y. Univ., 1962; Ph.D., Claremont Grad. School, 1976, P.E.
CASTRO, DONALD S. (1967) *Dean of Instruction; Professor, History*
A.B., UCLA, 1962; M.A., 1963; Ph.D., 1970.
CASTRO, PETER (1972) *Professor, Biological Sciences*
B.S., Univ. of Puerto Rico, 1974; M.S., Univ. of Hawaii, 1966; Ph.D., 1969.
CAUDLE, HAROLD V. (1973) *Physician I, Student Health Services*
M.D., State Univ. of Iowa, 1951; Internship, Letterman Army Hospital, San Francisco, 1951–52; Residency, Pediatrics, Children's Hospital, Los Angeles, 1954–56.
CAVIN, BROOKS, III (1975) *Associate Professor, Architecture*
B.A., Harvard College, 1964; B.Arch., Univ. of Minn., 1967; M.Arch., MIT, 1968.
CELIK, HASAN A. (1971) *Professor, Mathematics*
B.S., Middle East Tech. Univ., 1964; M.S., UC Santa Barbara, 1965; Ph.D., 1971.
CHANG, YU (1963) *Professor, Mathematics*
B.A., Cal State Univ., Sacramento, 1961; M.A., UC Davis, 1963.
CHARLES, ROBERT L. (1975) *Associate Dean, School of Arts; Assistant Professor, Communication Arts*
B.S., Cal State Univ., Fullerton, 1970; M.S., Illinois State Univ., Normal, 1971.
CHEEVER, JOHN K. (1968) *Professor, Accounting*
B.S., Univ., of Nev., Reno; 1963; M.B.A., 1968; D.B.A., USC, 1975; C.P.A.

CHEN, TSU-YEE (1969) *Professor, Mathematics*
B.S., Natl. Taiwan Univ., 1957; M.S., Univ. of Md., 1961; Ph.D., USC, 1967.
CHENG, YI (1981) *Associate Professor, Electrical and Computer Engineering*
B.S.E.E., National Taiwan Univ., 1970; M.S., 1972, and Sc.D., 1976, Massachusetts Institute of Technology.
CHORNEY, ALEXANDER H. (1962) *Professor, English and Foreign Languages*
B.A., UCLA, 1948; M.A., 1951; Ph.D., 1963.
CHRISTENSEN, ALLEN C. (1964) *Dean, School of Agriculture; Professor, Animal Science*
B.S., Brigham Young Univ., 1957; M.S., UC Davis, 1960; Ph.D., Utah State University, 1979.
CHURCH, DAVID A. (1962) *Professor, Communication Arts*
B.A., Cal State Univ., Los Angeles, 1959; M.A., 1961.
CHYLINSKI, ROBERT J. (1964) *Professor, Architecture*
B. Arch., UC Berkeley, 1962; M.Arch., 1963.
CLARK, DAVID L. (1966) *Associate Dean of Instruction, Professor, Electrical and Computer Engineering*
B.S.E.E., 1960; M.S.E.E., 1969, Cal State Univ., Los Angeles; Ph.D., Worcester Poly Inst., 1973.
CLARK, J. CURTIS (1980) *Assistant Professor, Biological Sciences*
B.S., Univ. of Oklahoma, Norman, 1972; M.S., 1974; Ph.D., UC Davis, 1979.
CLARK, PETER J. (1977) *Associate Professor, Civil Engineering*
B.S.C.E., N.J. Institute of Tech., 1969; M.S.C.E., Cal State Univ., Long Beach, 1976; P.E.
CLARK, ROBERT G. (1968) *Associate Professor, Communication Arts*
B.A., Yale Univ., 1953; J.D., Columbia Univ., 1956; M.A., Claremont Grad. School, 1968.
CLARKE, PHILLIP CHANDLER (1982) *Assistant Professor, Music*
B.M., Peabody Conservatory, 1965; M.M., 1966.
CLAY, CHARLES E. (1973) *Associate Professor, Political Science*
B.A., Cal State Univ., Los Angeles, 1966; M.P.A., USC, 1970; Ph.D., 1974.
COCKRUM, RICHARD H. (1980) *Associate Professor, Electrical and Computer Engineering*
B.S.E.E., Cal Poly Pomona, 1973; M.E., Cal Poly Pomona, 1975.
COGGER, EDWARD A. (1976) *Associate Professor, Animal Science*
B.S., Michigan State Univ., 1966; M.S., 1970; Ph.D., 1974.
COLE, DAVID E. (1962) *Professor, Agricultural Business Management*
B.S., Cal Poly State Univ., SLO, 1952.
COLOMAN, DONNA (1968) *Leadership Training Coordinator, Student Development*
B.A., Westminster College, 1966; M.S., Univ. of Utah, 1974.
COMPHER, ARTHUR J. (1970) *Physician I, Student Health Services*
D.O., 1954, Chicago Coll. of Osteopathy; M.D. and ENT, 1959, Los Angeles Coll. of Osteopathy.
COOK, DANETTE (1980) *Assistant Librarian, Catalog Department*
B.A., Biola College, 1976; M.S.L.S., USC, 1977.
COOK, STANLEY, J. (1969) *Professor, English and Foreign Languages*
B.A., Univ. of Minn., 1957; M.A., Univ. of Utah, 1966; Ph.D., 1969.
COOMBS, WALTER (1971) *Professor, Chair, Social Sciences*
B.A., Univ. of Montana, 1939; J.D. 1941.
COPPIN, VICTOR E. (1972) *Professor, Social Work*
B.A., City Univ. of New York, 1965; M.S.W., USC, 1967; D.S.W., 1974.
COULTER, BRUCE E. (1970) *Professor, HPERD*
B.A., Cal State Univ., Los Angeles, 1970; M.A., 1971.
COVARRUBIAS, ARTHUR G. (1970) *Admissions Officer*
B.A., B.S., Cal State Poly Univ., Pomona, 1970.
CRECELIUS, ANAHID T. (1970) *Professor, Foods and Nutrition & Home Economics*
B.S., Beirut Coll. for Women, 1959; M.S., Univ. of Ky., 1961; M.P.H., UCLA, 1967; D.P.H., 1969.
CRENWELGE, DENNIS D. (1980) *Associate Professor, Animal Science*
B.S., Texas A & M Univ., 1973; M.S., Michigan State Univ., 1978; Ph.D., Texas A & M Univ., 1983.
CRETSER, GARY A. (1966) *Professor, Chair, Behavioral Sciences*
B.A., USC, 1965; M.A., 1967; Ph.D., 1972.
CROISSANT, GERALD L. (1964) *Professor, Plant and Soil Science*
B.S., Colo. State Univ., 1959; M.S., Univ. of Idaho, 1961; Ph.D., Univ. of Wisc., 1965.
CULLEN, THEODORE J. (1966) *Professor, Mathematics*
B.S., DePaul Univ., 1955; M.S., 1956.

CUNHA, TONY J. (1975) *Special University Consultant on Agriculture*
B.S., Utah State Univ., 1940; M.S., 1941; Ph.D., University of Wisc., 1944.
CURRAN, DONALD C. (1966) *Professor, Engineering Technology*
B.S., U.S. Naval Acad., 1944; B.S.A.E., U.S. Naval Postgrad School, 1952; A.E., Cal Instit. of Tech., 1953; M.S., West Coast Univ., 1971; P.E.
CURRIE, MADELINE A. (1969) *Director, Grad. Studies; Professor, Management and Human Resources*
B.S., Texas Woman's Univ., 1962; M.A., Cal. State Univ., Los Angeles, 1967; Ed.D., UCLA, 1974.
DALE, LEON A. (1969) *Professor, Operations Management*
B.A., Tulane Univ., 1946; M.A., Univ. of Wisc., 1947; Ph.D., 1949.
DALE, WILLIAM R. (1964) *Professor, Urban Planning*
B.Arch., Univ. of Fla., 1958; M.C.R.P., Univ. of Pa., 1964.
DANIEL, RONALD S. (1968) *Professor, Biological Sciences*
B.A., San Jose State Univ., 1960; M.A., 1963; Ph.D., Univ. of Minn., 1968.
DAUGHERTY, RAYMOND C. (1960) *Professor, HPERD*
B.S., State Univ. of N.Y., Brockport, 1951; M.S., 1956.
DAVEY, ROBERT F. (1982) *Associate Professor, Aerospace Engineering*
B.A., USAF Academy, 1962; M.S., Ph.D., Calif. Inst. of Tech., 1971; M.B.A., Pepperdine Univ., 1982.
DAVIS, RUTHANNA (1971) *Professor, Foods and Nutrition & Home Economics*
B.S., Mich. State Univ., 1954; M.S. 1960.
DAVISON, BEAUMONT (1974) *Dean, School of Engineering; Professor, Electrical & Computer Engineering*
B.E., Vanderbilt Univ., 1950; M.E.E., Syracuse Univ., 1952; Ph.D., 1956.
DAWSON, PETER P. (1970) *Professor, Management and Human Resources*
B.A., Univ. of Iowa 1939; M.S.B.A., George Washington Univ., 1965; D.B.A., 1969, C.D.P.
DAY, SARAH W. (1976) *Associate Professor, Teacher Preparation Center*
B.A., Cal State Univ., Los Angeles, 1964; M.A., 1967; Ed.D., U.S.C., 1972.
DeCEGLIE, DANNY C. (1973) *Associate Professor, Operations Management*
B.A., Cal State Univ., Fullerton, 1965; M.B.A., U.S.C., 1968; Ph.D., Claremont Grad. School, 1975.
DEGEN, JAMES L. (1959) *Professor, Ornamental Horticulture*
B.S., Cal Poly State Univ., SLO, 1954; M.S., Univ. of Hawaii, 1970.
DELGADO, MOLLIE S. (1978) *Financial Aid Counselor*
B.S., Cal Poly, SLO, 1972.
DEV, VASU (1965) *Professor, Chemistry*
B.S., Punjab Univ., 1951; M.S., 1954; Ph.D., UC Davis, 1962.
DEVILBISS, MARY LEE (1972) *Librarian, University Bibliographer*
B.A., Oklahoma State Univ., 1965; M.L.S., Univ. Oklahoma, 1966.
DIAZ, RICHARDO (1982) *Career Counselor, The Career Center*
B.A., CSU Northridge, 1980.
DIMITMAN, JEROME E. (1949) *Professor, Biological Sciences*
B.S., UC Berkeley, 1943; M.S., UC Riverside, 1949; Ph.D., UC Berkeley, 1958.
DIONISIO, REMEDIOS C. (1980) *Physician I, Student Health Services*
A.A., Far Eastern Univ., Manila, Phillipines, 1956; M.D., 1961.
DIVELBESS, DIANE (1963) *Professor, Art*
B.A., Scripps Coll., 1957; M.F.A., Claremont Grad. School. 1959.
DOWELL, DOUGLAS C. (1968) *Professor, Mechanical Engineering*
B.S., Univ., of La., 1949; M.S. Air Force Inst. of Tech., 1956; Ph.D., Iowa State Univ., 1964; P.E.
DUNN, NORMAN K. (1960) *Professor, Animal Science; Coordinator, The W.K. Kellogg Arabian Horse Center*
B.S., Colo. State Univ., 1951; M.S., Kans. State Univ., 1960.
DUTRA, RAMIRO C. (1959) *Professor, Foods and Nutrition & Home Economics*
B.S., UC Davis, 1954; M.S., 1956; Ph.D., 1958.
EAGLETON, ROBERT D. (1968) *Professor, Physics*
B.S., Abilene Christian Coll., 1959; M.S., Okla. State Univ., 1961; Ph.D., 1968.
EASLEY, ROY C. (1973) *Professor, HPERD*
B.A., Cal State Univ., Los Angeles, 1962; M.A., 1969.
EAVES, RONALD W. (1968) *Professor, Computer Information Systems*
B.A., San Jose State Univ., 1959; M.A., 1962; Ph.D., UCLA, 1976; C.D.P.

EDMONDS, W. DAVID (1968) *Professor, Biological Sciences*
B.S., Texas Ag. and Mechanical Univ., 1963; Ph.D., Univ. of Kans., 1968.
EISEN, GEORGE (1979) *Assistant Professor, HPERD*
B.S., Univ. of Mass., 1973; M.S., 1976; Ph.D., Univ. of Md., 1979.
EHRENREICH, KEITH B. (1970) *Professor, Accounting*
B.A., St. Lawrence Univ., 1957; M.B.A., Fairleigh Dickinson Univ., 1965; D.B.A., U.S.C., 1976; C.P.A.
ELLIOTT, THOMAS J. (1970) *Professor, English and Foreign Languages*
A.B., Boston Coll., 1963; M.A., 1967; Ph.D., Univ. of Mich., 1970.
EMERY, L. LYNNE (1968) *Professor, HPERD*
B.S., Bowling Green State Univ., 1956; M.S., UCLA, 1958; Ph.D., USC, 1971.
ENGELKE, GEORGE F. (1965) *Professor, Mechanical Engineering*
A.B., Occidental Coll., 1958; B.S., Cal. Inst. of Tech., 1958; M.S., 1959.
ENGLEHART, STEPHEN F. (1977) *Associate Professor, History*
A.B., 1963; M.A., 1965, Washington Univ.; Ph.D., UCLA, 1975.
ENNERBERG, ERIK G. (1970) *Supervising Librarian, Acquisitions Department and Collection Development*
B.A., UC Riverside, 1963; M.S.L.S., USC, 1970; M.P.A., 1978.
ERSPAMER, JACK L. (1956) *Professor, Biological Sciences*
B.S., Univ. of Wash., 1941; Ph.D., UC Berkeley, 1951.
ESTERLINE, JOHN H. (1970) *Professor, Political Science*
B.A., Stanford Univ., 1938; M.A., 1946; Ph.D., UCLA, 1950.
EVANS, WILLIAM M. (1968) *Professor, History*
A.B., Univ. of N.C., 1948; M.A., 1950; Ph.D., 1965.
EWING-CHOW, FRANKLIN D. (1981) *Professor, Accounting*
B.A., Loma Linda Univ., 1965; M.B.A., Univ. of Hawaii, 1967; D.B.A., USC, 1977; CPA.
FAN, HSIN Y. (1969) *Professor, Mathematics*
B.S., Ordinance Engineering Coll., Taiwan, China, 1956; M.S., Chenkung Univ., Tainan, Taiwan, China, 1961; Ph.D., UCLA, 1970.
FANG, JOHN (1981) *Assistant Professor, Physics*
B.S., Fu Jen Univ., Taipei, 1969; M.S., Colorado State Univ., 1973; Ph.D., UCLA, 1978.
FARMER, BONNITA M. (1980) *Assistant Professor, Foods and Nutrition and Home Economics*
B.S., Indiana University, 1961; M.S., Univ. of Illinois, 1962; M.A., UC Riverside, 1977; Ph.D., 1979.
FARRELL, JOSEPH R. (1967) *Professor, English and Foreign Languages*
B.A., Gannon Coll., 1963; M.A., USC, 1965; Ph.D., 1968.
FEARS, EILEEN M. (1980) *Assistant Professor, Art*
B.A., San Jose State Univ., 1974; M.F.A., 1978.
FEENEY, ROBERT G. (1965) *Professor, Chemical and Materials Engineering*
B.S., Univ. of Pa., 1939; M.A., Claremont Grad. School, 1970.
FELZER, ALAN P. (1969) *Professor, Electrical and Computer Engineering*
B.S., UC Berkeley, 1966; M.S., 1967; Ph.D., 1969.
FIDLER, DEBRA D. (1980) *Financial Aid Counselor*
B.A., CSU Los Angeles, 1974.
FIGGINS, ROSS F. (1965) *Professor, Communication Arts*
B.A., Cal State Univ., Northridge, 1960; M.A., 1962; M.A., Univ. of Ill., 1964; Ph.D., USC, 1973.
FILLHART, DANIEL H. (1961) *Professor, Industrial and Manufacturing Engineering*
B.V.E., Cal State Univ., Los Angeles, 1966; M.A., 1973 CMfgE.
FINE, AUBREY H. (1981) *Assistant Professor, HPERD, Therapeutic Recreation*
B.A., Sir George Williams University, 1977; M.Ed., University of Alabama, 1978; Ed.D., University of Cincinnati, 1981.
FIRSTMAN, BRUCE L. (1962) *Professor, Biological Sciences*
A.B., Stanford Univ. 1952; M.A., 1954; Ph.D.; 1971.
FISHER, JOHN R. (1971) *Professor, Mathematics*
B.A., UC Riverside, 1966; M.A., 1968; Ph.D., 1971.
FLEISHANS, JOHN T., III (1973) *Professor, Management and Human Resources*
B.B.A., Detroit Inst. of Tech., 1964; M.B.A., Wayne State Univ., 1965; M.A.T., 1967; Ed.D., Ariz. State Univ., 1973.
FOLEY, DAVID G. (1970) *Associate Professor, Management and Human Resources*
B.S., Bryant Coll., 1951; M.Ed., UCLA, 1969; Ed.D., 1972.

FONDA, EDWARD S. (1982) *Assistant Professor, Animal Science*
B.S., Tulane Univ., 1974; M.S., Louisiana State Univ., 1978; Ph.D., Univ. of Georgia, 1982.
FORCE, DON C. (1965) *Professor, Chair, Biological Sciences*
A.B., Cal State Univ., Fresno, 1954; M.S., UC Davis, 1958; Ph.D., UC Berkeley, 1963.
FORD, BARBARA H. (1968) *Professor, Physical Education*
B.S., Cal State Poly Univ., Pomona, 1963; M.A., Cal Poly State Univ., SLO, 1965.
FORD-LIVENE, CARLOS (1964) *Professor, Mathematics*
A.B., Fisk Univ., 1958; A.M., USC, 1964; Ph.D., 1972.
FORGIONNE, GUISEPPI A. (1970) *Professor, Operations Management*
B.S., Wilke's Coll., 1966; M.B.A., Univ. of Scranton, 1968; Ph.D., UC Riverside, 1973.
FOTHERINGHAM, JOSEPH (1976) *Program Advisor, Student Development Center*
B.S., Cal Poly, Pomona, 1975.
FOX, WILLIAM E. (1961) *Senior Advisor to the President and Director of Business Affairs; Professor, Marketing Management*
B.S., Ohio State Univ., 1951; M.B.A., Univ. of Miami, 1959; D.B.A., USC, 1970.
FRANCIS, JOHN W. (1960) *Associate Vice President for Administration; Professor, Management Science and Production*
B.A., UCLA, 1950; J.D., 1960.
FREDRICK, CHARLES D. (1973) *Associate Professor, Art*
B.S., Southern Illinois Univ., 1964; M.A., Univ. of Iowa, 1970; M.F.A., 1972.
FREDERICKSEN, GARY E. (1977) *Director, The Career Center; Student Affairs Officer*
B.A., W. Wash. State College, 1969; M.Ed., 1970.
FREEMAN, FLINT G. (1978) *Associate Professor, Chair, Agricultural Science/Vocational Agriculture*
B.S. Cal Poly State Univ., SLO, 1967; M.S., 1972.
FRENCH, JERE STUART (1957) *Professor, Landscape Architecture*
B.A., Wash. Univ., St. Louis, 1951; B.S.L.A., Mich. State Univ., 1956; M.A., Cal State Univ., Fullerton, 1971.
FRIEDMAN, STUART M (1967) *Professor, Mathematics*
B.A., Columbia Univ., 1948; M.A., 1949; Ed.D., USC, 1966.
FROST, JACK B. (1967) *Professor, Physical Education*
B.S., Cal Poly State Univ., SLO, 1956; M.S., 1961.
FUJIMOTO, TERRANCE B.H. (1979) *Assistant Professor, Ornamental Horticulture*
B.S., Univ. of Hawaii, 1974; M.S., 1977; Ph.D., 1979.
FULBECK, JOHN F. (1958) *Professor, English and Foreign Languages*
A.B., USC, 1951; Ph.D., 1960.
FULLERTON, THEO F. (1978) *Coordinator, Career Planning/Career Counselor, The Career Center; Student Affairs Officer*
B.A., Principia, 1963; M.Ed., 1968; D.Ed., Pennsylvania State Univ., 1972.
FULTS, GAIL (1977) *Assistant Professor, Accounting*
B.S., Univ. of Utah, 1975; M.B.A., Claremont Grad. School, 1978.
GALBRAITH, EDWARD D. (1962) *Professor, Industrial and Manufacturing Engineering*
B.S.M.E., Univ. of Toledo, 1952; M.I.E., 1960 CMfgE, P.E.
GALBREATH, GEORGE T. (1953) *Professor, Economics*
A.B., Stanford Univ., 1948; M.A., 1949.
GANS, LYDIA P. (1964) *Professor, Mathematics*
B.A., UCLA, 1959; M.A., Cal State Univ., Los Angeles, 1964; Ph.D., UC Riverside, 1978.
GARFIELD, GARY M. (1978) *Associate Professor, Teacher Preparation Center*
B.A., Cal State Univ., Northridge, 1969; M.S., USC, 1972; Ed.D., Univ. of La Verne, 1980.
GARRITY, RODMAN F. (1962) *Professor, Teacher Preparation Center*
A.B., Cal State Univ., Los Angeles, 1950; M.A., S. Methodist Univ., 1955; Ed.D., USC, 1962.
GASSER, OTTO F. W. (1966) *Professor, HPERD*
B.A., UCLA, 1964; M.S., 1965; Ed.D., 1972.
GERSON, GUS J. (1979) *Professor, HPERD, Recreation Coordinator*
B.S., USC, 1958; M.S., Cal State Los Angeles, 1968; Ed.D., Brigham Young Univ., 1975.
GIBB, STANLEY G. (1974) *Associate Professor, Music*
B.M., San Francisco State Univ., 1968; M.M., 1970; D.M.A., North Texas State Univ., 1976.
GILBERT, ROBERT L. (1970) *Professor, Chair, Drama*
B.A., Univ. of Rochester, 1959; M.A., Univ. of Wash., 1962; Ph.D., 1967.

GILL-MAYBERRY, BARBARA (1972) *Associate Professor, English and Foreign Languages*
B.S., Hampton Inst., 1965; M.Ed., Western Washington State Coll., 1972.
GIPE, JEAN (1979) *Assistant Professor, Foods and Nutrition and Home Economics*
B.S., CSU Northridge, 1973; M.S., 1975.
GLASER, FRANK (1970) *Professor, Mathematics*
B.S., Loyola Univ., 1957; M.A., Cal State Univ., Los Angeles, 1966; Ph.D., UC Riverside, 1970.
GLASER, WALTER W. (1960) *Professor, Art*
B.A., UCLA, 1953; M.F.A., Claremont Grad. School, 1959.
GOEHLER, BRIGITTE H. (1967) *Professor, Biological Sciences*
Staatsexamen, Martin Luther Universitat, Halle-Wittenberg, 1951; M.S. Wayne State Univ., 1960; Ph.D., 1964.
GOGLIA, MARGARET R. (1979) *Assistant Professor, Architecture*
B.A., Environmental Design, SUNY, 1973; M. Environmental Design, Yale University, 1975.
GOLDSTEIN, CAROL A. (1978) *Director, Disabled Student Services*
B.A., S. Illinois University, 1973; M.A., 1975.
GOLDSTEIN, ELISHEVA (1981) *Associate Professor, Chemistry*
B.S., CCNY, 1968; M.S., Cal Poly, 1974; Ph.D., USC, 1978.
GONZALEZ, TRINIDAD (1981) *Assistant Professor, English and Foreign Languages*
B.A., Universidad de Costa Rica, 1966; M.S., University of Pittsburgh, 1969; Ph.D., 1980.
GOODIN, JAMES D. (1962) *Professor, Mechanical Engineering*
B.S.M.E., USC, 1957; M.Div., Fuller Theological Seminary, 1966; M.S.E., UCLA, 1972.
GRAHAM, LAURENCE D. (1981) *Associate Professor, Electrical and Computer Engineering*
B.A., Oberlin College, 1962; M.S. University of Washington, 1963; Ph.D., Northwestern University, 1968.
GRASMICK, DAVID M. (1976) *Associate Professor, Music*
B.M.E., 1969; M.M., 1974, Univ. of Nebraska, Lincoln.
GRAVES, GEORGE R. (1958) *Professor, Aerospace Engineering*
B.S., Marquette Univ., 1955; M.S., Cal State Univ., Long Beach, 1968.
GREEN, KENNETH A. (1965) *Counselor, Counseling and Testing; Associate Professor, Social Work*
B.A., UC Berkeley, 1948; M.S.W., 1950.
GREENE, DAVID M. (1982) *Director/Professor, Teacher Preparation Center*
B.A., 1962; M.A., CSU Los Angeles, 1969; Ph.D., Claremont Graduate School, 1973.
GREENWAY, JOAN M. (1971) *Professor, Social Sciences*
B.A., Univ. of Colo., 1968; M.A., 1969; Ph.D., 1970.
GRISELLE, SHERMAN W. (1966) *Professor, Urban Planning*
B.S.L.A., Mich. State Univ., 1953; B.S.U.P., 1954; M.U.P., 1956.
GRUBE, BRUCE F. (1977) *Associate Professor, Chair, Political Science*
A.B., UC Berkeley, 1964; M.A., Calif. State Univ., Los Angeles, 1967; Ph.D., Univ. of Texas, 1975.
GUPTA, VINAY (1973) *Professor, Accounting*
B.A., Univ. of Calcutta, 1963; M.B.A., Indian Inst. of Mgmt., 1966; M.S., UCLA, 1970; Ph.D., 1974.
GUTNIKOV, GEORGE (1971) *Professor, Chemistry*
B.S., Wayne State Univ., 1960; M.S., 1961; Ph.D., Univ. Ariz. 1966.
HACKER, ARTHUR E. (1978) *Associate Dean, School of Environmental Design, Associate Professor, Architecture*
B.A., Yale University, 1965; M. Architecture, 1970.
HACKETT, GERALD E., JR. (1980) *Professor, Animal Science*
B.S., Univ. of Minnesota, 1972; M.S., 1979; D.V.M., 1978.
HALDERMAN, DONALD L. (1959) *Professor, HPERD*
B.S., USC, 1951; M.S., 1960.
HALLDANE, JOHN F. (1980) *Professor, Architecture*
B. Architecture, University of New Zealand, 1960; Ph.D., 1963.
HAMBLIN, RICHARD L. (1972) *Professor, Teacher Preparation Center*
B.A., Ariz. State Univ., 1955; M.A., Creighton Univ., 1961; Ph.D., Kansas State Univ., 1972.
HAMILTON, MILTON E. (1981) *Associate Professor, Electrical and Computer Engineering*
B.S.E.E., U.C. Berkeley, 1958; M.S.E.E., Univ. of Southern California, 1960.
HAMMOND, BERT D. (1970) *Counselor*
B.S., Ohio State Univ., 1950; M.A., Cornell Univ., 1955.
HANER, DAVID A. (1969) *Professor, Chemistry*
B.S., Univ. of Miami, 1956; M.S., USC, 1963; Ph.D., 1967.

HANNA, JOHN (1972) *Program Coordinator, Student Development Center*
B.S., Indiana State, 1960; M.S., Indiana Univ., 1971.
HANNIBAL, JOE H. (1981) *Associate Professor, Chair, Art*
B.S., Austin Peay State Univ., 1968; M.F.A., University of Tennessee, 1972.
HARKEY, NANCY J. (1978) *Associate Professor, Behavioral Sciences*
B.A., San Diego State Univ., 1970; M.A., 1973; Ph.D., Claremont Grad. School, 1978.
HARMER, RUTH M. (1960) *Professor, English and Foreign Languages*
A.B., Barnard Coll., 1941; M.A., Columbia Univ., 1942; Ph.D., USC, 1972.
HARRIS, WILLIAM M. (1960) *Professor, Chemical and Materials Engineering*
B.S., Mo. Sch. of Mines and Metallurgy, 1950; B.S.M.E., 1952, J.D., Citrus Belt Law School, 1975; P.E.
HART, GEORGE P. (1967) *Associate Professor, Political Science*
B.A., UC Santa Barbara, 1959; M.A., Claremont Graduate School, 1972.
HART, JOSEPH (1983) *Director, Counseling and Testing Services*
B.A., Lewis and Clark, 1958; M.S., Univ. of Wisconsin, 1961; Ph.D. Stanford, 1965.
HARVEY, KAREN A. (1970) *Associate Librarian, Reference Department*
B.A., USC, 1959; M.S.L.S., 1969.
HATFIELD, JOHN (1970) *Professor, Ethnic and Women's Studies, Chair, Liberal Studies*
B.A., Palos Verdes Coll., 1955; Th.M., School of Theology, Claremont, 1961; Ph.D., Claremont Grad. School, 1965.
HEALEY, ROBERT J. (1958) *Associate Dean, School of Business Administration*
B.S., State Teachers' Coll., Salem, Mass., 1950; M.S., Okla. State Univ., 1952; Ph.D., Claremont Grad. School, 1971.
HEATH, FREDERICK B. (1962) *Professor, History*
A.B., Syracuse Univ., 1949; M.A., 1950; Ph.D., USC, 1958.
HELMLE, PAUL N. (1975) *Acting Department Chair, Professor, Architecture*
B.Arch., Univ. of Ill., 1959; M.F.A., Princeton Univ., 1961.
HENDERSON, MAREN H. (1973) *Associate Professor, Art*
B.A., Vassar Coll., 1957; M.A., UC Berkeley, 1960.
HERBER, LAWRENCE J. (1966) *Professor, Earth Sciences*
B.S., St. Joseph's Coll., 1959; M.S., N.M. Inst. of Mining and Tech., 1962; Ph.D., Univ. of Nev., Reno, 1968.
HERMSEN, RICHARD J. (1968) *Professor, Electrical and Computer Engineering*
B.S.E.E., Univ. of Wisc., 1959; M.S.N.E., 1960; Ph.D., 1963; P.E.
HERNANDEZ-ARAICO SUSANA (1972) *Professor, English and Foreign Languages*
B.A., Mount St. Mary's Coll., 1968; M.A., UCLA, 1972; Ph.D., 1976.
HERZOG, EMIL R. (1968) *Professor, Mathematics*
M.A., Univ. of Basel, Switzerland, 1947; Ph.D., 1947.
HESSE, WALTER H. (1956) *Professor, Earth Sciences*
B.S., Cal Poly State Univ, SLO, 1952; M.S., Cornell Univ., 1953; Ph.D., 1955.
HIEMENZ, PAUL C. (1965) *Professor, Chemistry*
B.S., Loyola Univ., 1958; Ph.D., USC, 1964.
HILL, JAMES R. (1967) *Professor, Chair, Marketing Management*
B.A., DePauw Univ., 1949; M.B.A., Miami Univ. 1967.
HILL, WILLIAM F. (1970) *Professor, Behavioral Sciences*
B.S., Univ. of British Columbia, 1950; M.S., 1950; Ph.D., Univ. of Chicago, 1954.
HILLAM, BRUCE (1973) *Associate Professor, Chair, Computer Science*
B.S., UC Riverside, 1968; M.A., 1969; Ph.D., 1973.
HO, FRANKLIN Y. H. (1961) *Professor, Economics*
B.A., Natl. Southwestern Assoc. Univ., 1942; M.A., USC, 1951; Ph.D., 1957.
HOFER, JACK E. (1973) *Professor, Mathematics*
A.B., Goshen Coll., 1958; M.Ed., Western Wash. Coll., 1965; Ph.D., Ore. State Univ., 1972.
HOFMANN, CHARLES (1977) *Associate Professor, Electrical and Computer Engineering*
B.S., San Diego State Univ., 1957; M.S., 1958; P.E.
HOHMANN, EDWARD C., JR. (1971) *Professor, Chair, Chemical & Materials Engr.*
B.S., U.S.C., 1966; M.S., Mich. State Univ., 1967; Ph.D., USC 1971, P.E.
HOLDER, CAROL R.(1972) *Associate Professor, English and Foreign Languages*
B.A., New College, 1967; M.A., Univ. of No. Carolina, 1969; Ph.D., Claremont Grad. School, 1979.

HOLLIS, W. SLATER (1980) *Dean School of Business Administration; Professor, Finance, Insurance, and Real Estate*
B.S. B.A., Univ. of Arkansas, 1952; M.A. Memphis State Univ., 1962; J.D., Univ. of Arkansas, 1969; Ph.D., Univ. of Miss., 1972.

HOOK, DONALD G. (1969) *Associate Professor, Mathematics*
B.S., Huron Coll., 1954; M.S., So. Dak. State Univ., 1960; M.A., UC Berkeley; Ph.D., Ore. State Univ., 1973.

HOPKINS, PATRICIA M. (1976) *Associate Professor, Marketing Management*
B.A., Cal State Univ., Fullerton, 1971; M.B.A., 1972; Ph.D., Claremont Grad. School, 1977.

HORWITZ, DAVID A. (1965) *Professor, Mathematics*
B.A., USC, 1956; M.S., 1959; M.A., Cal. State Univ., Los Angeles, 1963.

HOSHMAND, A. REZA, (1980) *Associate Professor, Agricultural Business Management*
B.S., University of Hawaii, 1971; M.S., University of Wisconsin, 1972; Ph.D., University of Maryland, 1978.

HOSTETLER, DANIEL G. (1980) *Assistant Professor, Plant and Soil Science*
B.S., Cal Poly, Pomona, 1975; M.S., 1982.

HOUSE, HENRY (1947) *Dean of Students; Professor, Animal Science*
B.S., Cal Poly State Univ., SLO, 1943.

HOUSER, GENE L. (1975) *Professor, Chair, Management and Human Resources*
B.S., Indiana State Univ., 1950; M.S., Univ. of Mich., 1954; Ed.D., Univ. of Colo., 1966.

HOYT, DONALD F. (1980) *Assistant Professor, Biological Sciences*
B.A., Pomona College, 1967; Ph.D., UCLA, 1977.

HSIA, TING-MEI (1972) *Supervising Librarian, Catalog Department*
B.A., Tunghai Univ., 1959; M.A. L.S., Univ. of Denver, 1961.

HSIA, YU-PING (1968) *Professor, Chemistry*
B.S., Tunghai Univ., 1959; M.A., UC Santa Barbara. 1963; Ph.D., Ill. Inst. of Tech., 1967.

HUGHES, WILLIAM C. (1967) *Professor, Agricultural Business Management*
B.S., Cal State Poly Univ., Pomona, 1965; M.S., Univ. of Nev., 1967.

HUMPHREY, THEODORE C. (1968) *Professor, English and Foreign Languages*
B.A., Okla. State Univ., 1960; M.A., Univ. of Ark., 1962; Ph.D., 1972.

HUNG, YOU-TSAI (1969) *Acting Department Chair, Professor, Agricultural Engineering*
B.S. Natl. Taiwan Univ., 1956; M.S., Mich. State Univ., 1964; Ph.D., 1969; P.E.

HURTER, ANDREW J. (1977) *Physician II, Student Health Services*
B.S., Univ. of Illinois, 1935; M.D., 1939; Diplomat of American Board of Obstetrics and Gynecology, 1949.

HUTCHINSON, RALPH B. (1968) *Professor, Economics*
A.B., UC Berkeley, 1953; M.A., 1960; Ph.D., U C L A, 1969.

HWANG, HUA KUO (1982) *Associate Professor, Electrical and Computer Engineering*
B.S., National Taiwan Univ., 1969; M.S., Marguette Univ., 1972; Ph.D., Colorado State Univ., 1977.

HYLTON, RICHARD M. (1980) *Associate Professor, Agricultural Science/Vocational Ag.*
B.S., Virginia Poly Institute & State Univ., 1976; M.S., Mississippi State Univ., 1979; Ed.D., Mississippi State Univ., 1981.

HYSLOP, RICHARD S. (1970) *Professor, Social Sciences*
B.A., Cal State Univ., Fullerton, 1966; M.A., U C Irvine, 1967; J.D., U C L A, 1970.

IRBY, CHARLES C. (1974) *Professor, Ethnic and Women's Studies*
B.A., Cal State Univ., Sacramento, 1966; M.A., U C Davis, 1968; Ph.D., Simon Frazer Univ., 1978.

IRVINE, ROBERT G. (1976) *Associate Professor, Electrical and Computer Engineering*
B.S., Utah State Univ., 1956; B.S., Cal State Univ., Los Angeles, 1975; P.E.

IRWIN, LARRY D. (1965) *Professor, Mathematics*
B.A., Hardin-Simmons Univ., 1961; M.S., N.M. State Univ., 1963.

ISSHIKI, KOICHIRO R. (1971) *Professor, Computer Information Systems*
B.S., Matsuyama Univ., 1964; M.A., Chapman Coll., 1967; Ph.D., U C L A, 1971.

IVES, QUAY D. (1960) *Professor, Industrial and Manufacturing Engineering*
B.S., Tex. Coll. of Arts and Industries, 1950; M.S., 1951; Ed.D., U C L A, 1971, CMfgE.

JABBOUR, ANTOINE G. (1980) *Associate Professor, Accounting*
B.A., Middle East College, Lebanon, 1958; M.B.A., Andrews Univ., 1966; Ph.D., Catholic Univ. of America, 1975; C.P.A.

JACKSON, JAMES O. (1972) *Professor, Biological Sciences*
B.S., Univ. of S. Western La., 1965; M.S., 1967; Ph.D., Univ. of Kansas, 1970.

JACKSON, LEON S. (1961) *Professor, HPERD*
B.S., Cal State Poly Univ., Pomona, 1960; M.A., Cal Poly State Univ., SLO, 1965.
JACOBS, HARRY M. (1972) *Director, Financial Aids*
B.A., Cal State Univ., Los Angeles, 1964; M.A., 1967.
JACOBS, RICHARD C. (1976) *Associate Professor, Teacher Preparation Center*
B.A., Cal State Univ., Los Angeles, 1959; M.A., 1965; Ph.D., Claremont Grad. School, 1976.
JANGER, FRANK (1981) *Associate Professor, Civil Engineering*
B.C.E. Manhattan College, 1968; M.E., Manhattan College, 1969.
JAQUES, DAVID G. (1965) *Professor, Economics*
B.A., UC Berkeley, 1962; M.A., Claremont Grad. School, 1965; Ph.D., 1973.
JESSEY, DAVID R. (1982) *Associate Professor, Earth Sciences*
B.S., Youngstown, Ohio, 1972; M.S., Univ. of Missouri—Rolla, 1974; Ph.D., 1980.
JIN, HYUNG K. (1977) Acting Chair, *Professor, Finance, Real Estate and Law*
B.A., Yonsei Univ., Korea, 1958; M.B.A., Univ. of Utah. 1965; D.B.A., U S C, 1971.
JOHNSEN, ARTHUR (1967) *Professor, Marketing Management*
B.S., Northwestern Univ., 1950; M.B.A., U S C, 1962.
JOHNSON, ALBEN C. (1966) *Associate Professor, Electrical & Computer Engineering*
B.S., Cal Poly State Univ., SLO, 1954.
JOHNSON, KENNETH A. (1982) *Assistant Professor, Urban Planning*
B.A., Hunter College, 1970; M.R.P., Syracuse University, 1973; Ph.D., 1981.
JOHNSON, MELANIE S. (1980) *Financial Aid Counselor*
B.A., Immaculate Heart College, 1976.
JOHNSON, RICHARD L. (1971) *Professor, Social Sciences*
B.A., Pomona Coll., 1966; Ph.D., Claremont Grad. School, 1971.
JOHNSON, VIRGINIA (1971) *Professor, Teacher Preparation Center*
B.E., LaVerne Coll., 1938; M.A., 1970.
KAAE, RICHARD S. (1972) *Associate Professor, Plant & Soil Science*
B.S., Cal State Univ., Long Beach, 1965; M.S., 1967; Ph.D., UC Riverside, 1971.
KACHUN, JOSEPH (1959) *Professor, Mathematics*
B.A., Univ. of Pittsburgh, 1940.
KAMUSIKIRI, JAMES G. (1970) *Professor, History*
B.A., Calif. Western Univ., San Diego, 1967; M.A., 1971, Ph.D., 1978, U C L A.
KAPLAN, CAROLA M. (1968) *Professor, English & Foreign Languages*
B.A., Brooklyn Coll., 1963; M.A., Cornell Univ., 1964; Ph.D., 1974.
KASHEFINEJAD, DJAVAD (1982) *Associate Professor, Finance, Real Estate and Law*
M.B.A., Claremont Graduate School, 1978; Ph.D., 1981.
KEATING, EUGENE K. *Professor, Animal Science*
B.S., Kansas State Univ., 1953; M.S., 1954; Ph.D., Univ. of Ariz., 1964.
KEELE, GARY D. (1970) *Professor, Communication Arts*
B.S., Univ. of Ore., 1963; M.S., 1965; Ph.D., U S C, 1977.
KELLNER, ROCHELLE A. (1981) *Assistant Professor, Accounting*
B.A., UCLA, 1969; M.Ed., UCLA, 1970.
KELLY, EDWARD M. (1957) *Professor, Physics*
B.S., Penn State Univ., 1946; M.S., 1946; Ph.D., Brown Univ., 1948.
KENNINGTON, MACK H. (1958) *Professor, Animal Science*
B.S., Univ. of Idaho, 1946; M.S., Purdue Univ., 1956; Ph.D., 1958.
KERWIN, JAMES D. (1969) *Associate Professor, Physics*
B.A., La Salle Coll., 1958; M.S., St. John's Univ., 1961; Ph.D., 1968.
KING, ALICE M. (1965) *Professor, Mathematics*
B.A., UC Riverside, 1956; M.A., 1965; Ph.D., Claremont Grad. School, 1975.
KING, DONALD W. (1961) *Professor, Engineering Technology*
A.B., Stanford Univ., 1947; M.S.C.E., 1948; Engineer's Degree in Civil Engineering, 1949.
KING, LOUIS J. (1958) *Professor, Behavioral Sciences*
B.A., U C L A, 1943; M.S.W., U S C, 1951; Ed.D., 1958.
KING, THOMAS M. (1966) *Professor, Mathematics*
A.B., UC Berkeley, 1963; M.A., Western Wash. State Coll., 1966.
KLASIK, JOHN A. (1977) *Associate Professor, Earth Sciences*
B.S., SUNY Stony Brook, 1970; M.A., Duke Univ., 1972; Ph.D., Louisiana State Univ., 1976.

KLEIN, MARVIN L. (1981) *Associate Professor, Agricultural Business Management*
B.S., Western Michigan Univ., 1970; M.A., Western Michigan Univ., 1972; Ph.D., Michigan State Univ., 1979.
KNILL, LAMAR M. (1960) *Professor, Biological Sciences*
B.S., Colo. State Univ., 1951; M.S., 1955; Ph.D., 1967.
KNUDSEN, A. RUSSELL (1960) *Associate Professor, Electrical & Computer Engineering*
A.B., Brigham Young Univ., 1941.
KOEPER, H. FREDERICK (1971) *Professor, Architecture*
B.A., Harvard Univ., 1949; M.A., 1950; Ph.D., 1969.
KOGA, JAMES S. (1979) *Assistant Librarian, Reference Department*
B.S., Cal Poly, San Luis Obispo, 1976; M.L.S., UC Berkeley, 1978.
KOONCE, GARY W. (1968) *Professor, Mechanical Engineering*
B.S., Texas A & M Coll., 1964; M.S., Univ. of Mo., 1966.
KOREY, JOHN L. (1971) *Professor, Political Science*
A.B., Georgetown Univ., 1966; Ph.D., Univ. of Florida, 1971.
KOUTRAS, ALEXANDER E. (1979) *Associate Professor, Electrical and Computer Engineering*
B.S.E.E., Univ. of Akron, 1967; M.S.E.E. Cal State Univ., Long Beach, 1970.
KRIEGE, KENNETH B. (1957) *Professor, Computer Science*
B.S., Cal Poly State Univ., SLO, 1951; M.A. 1951.
KUMAR, RAMESH (1980) *Assistant Professor, Agricultural Engineering*
B.S., Punjab Agricultural Univ., 1970; M.S., Univ. of California, Davis, 1975; Ph.D., Univ. of California, Davis, 1978.
KUPSH, JOYCE (1978) *Professor, Management Human Resources*
B.S., Emporia State College, 1957; M.S., 1961; Ed.D., Ariz. State Univ., 1975.
KURTZ, KENT W. (1969) *Professor, Ornamental Horticulture*
B.S., So. Ill. Univ., 1963; M.A., West Mich. Univ., 1967; Ph.D., Univ. of Arizona, 1981.
LAKSHMINARAYANA, MYSORE R. (1978) *Associate Professor, Electrical and Computer Engineering*
B.E. Bangalore Univ., 1969; M.E., Univ. of Delaware, 1974; Ph.D., 1977.
LAMONTAGNE, THERESE (1980) *Senior Assistant Librarian, Circulation Department*
B.S., Laval Univ., Quebec, 1971; M.L.S., Univ. of Montreal, 1976.
LANE, BERNARD O. (1963) *Professor, Earth Sciences*
B.S., Univ. of North Carolina, 1950; M.S., Brown Univ., 1955; Ph.D., U S C, 1959.
LANDWEHR, JO ANN (1981) *Assistant Professor, Marketing Management*
B.A., St. Cloud State Univ., 1978.
LANSFORD, FRANK D. (1964) *Professor, HPERD*
B.S., Tenn. Poly Univ., 1953; M.A., George Peabody Coll., 1954; Ed.D., U C L A, 1971.
LARSON, WILLIAM R. (1969) *Professor, Behavioral Sciences*
B.A., Univ. of Wash., 1955; M.A., 1958; Ph.D., 1965.
LASSWELL, MARCIA E. (1961) *Professor, Behavioral Sciences*
B.A., UC Berkeley, 1949; M.A., U S C, 1952.
LASZLO, PETER A. (1972) *Associate Professor, Computer Science*
B.S., Cal Tech., 1962; M.A., U C L A, 1967; Ph.D., 1971.
LEE, KEI A. (1965) *Professor, Mathematics*
B.S., Univ. of Mich., 1960; B.S., 1961; M.S., 1962; Ph.D., U C L A, 1976.
LEFF, HARVEY S. (1983) *Professor, Chair, Physics*
B.S., Illinois Inst. of Tech., 1959; M.S. Northwestern Univ., 1960; Ph.D., Univ. Iowa, 1963.
LEFFLER, ESTHER B. (1967) *Associate Dean, School of Science; Professor, Chemistry*
B.A., Penn State Univ., 1945; Ph.D., Univ. of Va., 1950.
LEON, JOSEPH J. (1975) *Associate Professor, Behavioral Sciences*
B.A., Univ. of Hawaii, 1971; M.A., 1973; Ph.D., 1975.
LEVERING, DAVID L. (1963) *Professor, History*
B.A., Univ. of Redlands, 1950; M.A., Claremont Grad. School, 1960; Ph.D., 1974.
LEVITT, HAROLD P. (1969) *Professor, Chair, English and Foreign Languages*
B.A., Princeton Univ., 1956; M.A., N.Y. Univ., 1961; Ph.D., 1968.
LI, SEUNG P. (1968) *Professor, Electrical & Computer Engineering, Director, Engineering Graduate Studies*
B.S., Hong Kong Univ., 1954; M.S., Princeton Univ., 1960; Ph.D., Univ. of Colo., 1966.

LIM, CONSTANCE C. (1975) *Associate Professor, Teacher Preparation Center*
B.A., Marion College, 1960; M.A., S. Ill. Univ., 1961; Ed.D., Rutgers Univ., 1974.
LIM, SUE C. (1977) *Supervising Librarian, Acting Head, Catalogue Department*
B.A., Pusan National Univ., Korea, 1957; M.A., Ewha Womens Univ., Seoul, Korea, 1959; M.A., Univ. of Nevada, 1967; M.L.S., U C Berkeley, 1971.
LINDSLEY, CHARLES E. (1970) *Professor, Music*
B.M.E., Wichita State Univ., 1962; M.A., Univ. of Iowa, 1965; Ph.D., 1968.
LINGENFELTER, BARBARA H. (1964) *Professor, Teacher Preparation Center*
B.A., Santa Barbara State Coll., 1934; M.E., U C L A, 1955.
LITTLE, SHARON A. (1979) *Financial Aid Counselor*
B.A., Cal State Fullerton, 1978.
LIU, HSUN K. (1976) *Associate Professor, Computer Science*
B.S.E.E., National Cheng-Kung Univ., 1968; M.S.E.E., Univ. of Cincinnati, 1971; Ph.D., SUNY Buffalo, 1976.
LOGGINS, CHARLES E. (1976) *Associate Professor, Urban Planning*
A.B., San Francisco State Univ., 1971; M.C.P., Harvard Univ., 1973.
LOGGINS, CHERYL L. (1966) *Professor, Foods and Nutrition & Home Economics*
B.S., U C L A, 1955; M.S., 1958.
LOPEZ, CONSUELO G. (1975) *Associate Professor, Acting Chair, Social Work*
B.A., Cal State Univ., Los Angeles, 1964; M.S.W., U S C, 1966; D.S.W., 1976.
LOPEZ, JAMES (1970) *Director, Educational Opportunity Program*
B.S., Cal State Poly Univ., Pomona, 1970; M.A. Univ. of Redlands, 1975.
LOPEZ, LEO (1977) *Assistant Professor, Teacher Preparation Center*
B.A., Calif. State Univ., Los Angeles, 1961; M.S., USC, 1972; M.A., 1974; Ph.D., Claremont Grad. School, 1976.
LORD, DAVID G. (1968) *Professor, Social Sciences*
B.A., Mich. State Univ., 1964; M.A., 1967; Ph.D., U C Riverside, 1975.
LORD, PAUL A. (1980) *Associate Professor, Aerospace Engineering*
B.S., Univ. of Colo., 1956; M.S., 1959.
LOSSER, ROBERT L. (1968) *Student Affairs Assistant Registrar*
B.S., Westminister Coll., 1961; M.A., Cal. State Univ., Los Angeles, 1972.
LOTHROP, GLORIA R. (1970) *Professor, History*
B.A., Immaculate Heart Coll., 1956; M.A., 1963; Ph.D., U S C, 1970.
LOVEWELL, IRENE M. (1958) *Supervising Evaluator, Admissions and Records*
B.A., Univ. of Idaho, 1940.
LUNDBERG, DONALD E. (1973) *Professor, Hotel, Restaurant, and Travel Management*
B.A., Univ. Northern Iowa, 1941; M.A., Duke Univ., 1942; Ph.D., Cornell Univ., 1946.
LYLE, JOHN T. (1968) *Professor, Chair, Landscape Architecture*
B.Arch., Tulane Univ., 1957; M.L.A., UC Berkeley, 1966.
MacDONALD, KENNETH A. (1962) *Professor, Computer Science*
B.A., Univ. of Ariz., 1956; M.A., Univ. of Vermont, 1958.
MACROPOL, JOHN (1960) *Professor, Physics*
B.A., UC Berkeley, 1954; M.S., Mich. State Univ., 1955.
MAKOW, YORAM (1965) *Professor, Art*
B.A., U C L A, 1963; M.A., 1965.
MALECHA, MARVIN J. (1976) *Dean, School of Environmental Design, Associate Professor, Architecture*
B. Arch., Univ. of Minn., 1973; M. Arch., Harvard Univ., 1974.
MANES, SHEILA G. (1982) *Assistant Professor, Social Sciences*
B.A., UCLA, 1969; M.A., 1972; Ph.D., 1982.
MANLEY, JAMES C. (1976) *Associate Professor, Social Sciences*
B.A., 1963; M.A., 1964, Ph.D., 1972, Univ. of Michigan.
MARCUS, DANIEL A. (1978) *Associate Professor, Mathematics*
B.A., Adelphi Univ., 1967; M.A., York University, 1969; Ph.D., Harvard Univ., 1972.
MARKS, GREGORY H. (1967) *Professor, HPERD*
B.S., Pepperdine Coll., 1960; M.A., 1965.
MARTIN, JAMES L. (1971) *Associate Professor, Drama*
B.A., Hardin-Simmons Univ., 1953; M.F.A., Univ. of Tex., Austin, 1961; Ph.D., U C L A, 1971.

MARTINEK, GEORGE W. (1967) *Professor, Biological Sciences*
B.S., Concordia Teachers Coll., 1953; M.A., Calif. State Univ., Los Angeles 1960; Ph.D., U C L A, 1968.

MARTINEZ, PATRICIA (1977) *Women's Center Coordinator, Student Development Center*
B.S., Cal Poly, Pomona, 1975; M.S., Cal State Long Beach, 1980.

MASLOWSKI-MAYA, HENRYKA B. (1969) *Professor, Mathematics*
B.A., Barnard Coll., 1963; M.A., Univ. of Cincinnati, 1966; Ph.D., 1973.

MASON, IDA W. (1980) *Associate Professor, Computer Information Systems*
B.A. Douglass College, N.J., 1964; M.A. Univ. Miami, 1978.

MASSOUD, MORCOS F. (1980) *Professor, Chair, Accounting*
B.Comm., Alexandria University, Egypt, 1960; M. Conn, 1962; M.B.A., New York Univ.; 1969; Ph.D., 1973; C.M.A.

MATHIS, SHARON (1975) *Coordinator Student Employment and Cooperative Education, The Career Center*
B.A., California State Polytechnic University, Pomona, 1979.

MATHUR, FRANCIS P. (1977) *Professor, Mathematics*
B.E.E., Nat'l. Univ. of Ireland, 1963; M.S.E.E., U C L A, 1967; Ph.D., 1970.

MATSUSHIMA, CEDRIC (1971) *Professor, Animal Science*
B.S., Cal Poly State Univ., SLO, 1965; M.S., Iowa State, 1967; Ph.D., 1971.

MATTHEWS, FLOYD V., JR. (1968) *Professor, Chair, Agricultural Engineering*
B.S., Va. Poly. Inst., 1950; M.S., Okla. State Univ., 1951; Ph.D., Mich. State Univ., 1966; P.E.

MAY, B. DARLENE (1974) *Assistant Atheletic Director—Coach, Physical Education*
B.S., Cal State Univ., Fullerton, 1967; M.S., 1971.

MAYA, WALTER (1972) *Professor, Chemistry*
B.S., U C L A, 1952; Ph.D., 1954.

McADAMS, WILLIAM L. (1970) *Associate Professor, English and Foreign Languages*
B.A., Rice Univ., 1958; M.A., 1960; Ph.D., 1962.

McCOY, MARGARITA P. (1976) *Professor, Chair, Urban Planning*
B.A., Boston Univ., 1944; M.Pl., U S C, 1969.

McELHOE, FORREST L., JR. (1968) *Associate Professor, Social Sciences*
B.A., Univ. of Wash., 1948; M.A., 1950; Ph.D., Ohio State Univ., 1955.

McGRAW, JANE S. (1970) *Associate Director, Professor, Teacher Preparation*
B.Ed., Univ. of Hawaii, 1960; M.S., Cal State Univ., Fullerton, 1969; Ed.D., U S C, 1978.

McINTOSH, WILLIAM C. (1951) *Professor, Mathematics*
A.B., UC Berkeley, 1948; M.A., 1950.

McKANE, LARRY K. (1976) *Associate Professor, Biological Sciences*
B.S., Univ. of Oklahoma, 1969; M.S., Univ. of Oklahoma Health Sciences Center, 1971; Ph.D., 1974.

McKEE, GILBERT JAMES, JR. (1969) *Professsor, Chair, Finance, Real Estate and Law*
B.A., Claremont Men's Coll., 1963; M.A., Claremont Grad. School, 1967; Ph.D., 1972.

McKINNEY, JAMES R. (1973) *Associate Professor, Mathematics*
A.B., UC Berkeley, 1964; M.S., U of Michigan, 1966; M.S., Univ. of Miss., 1981; Ph.D., U of Missouri, 1973

McKINNEY, JUDITH (1973) *Associate Professor, Mathematics*
B.A., Beloit College, 1967; M.S., Louisiana State Univ., 1969; Ph.D., Univ. of Missouri, 1982.

MC LAUGHLIN, ERIC J. (1976) *Associate Professor, Finance, Real Estate and Law*
B.S., Univ. of Calif., Davis, 1972; M.S. Univ. Calif., Davis, 1974; M.B.A., Claremont Grad. School, 1978; Ph.D., Claremont Grad. School, 1982.

McLAUGHLIN, MARGARET S. (1974) *Associate Vice President for Academic Affairs; Associate Professor, Ornamental Horticulture*
B.S., UC Davis, 1972; M.S., 1974.

McMILLAN, JOHN C. (1962) *Professor, Electrical & Computer Engineering*
B.A., Pomona Coll., 1948; M.A., Claremont Grad. School, 1956; P.E.

McNEES, CARYL (1972) *Professor, English and Foreign Languages*
B.A., Grove City Coll., 1950; M.Ed., Univ. of Pittsburgh, 1968; Ed.D., Univ. of Va., 1972.

MEDLEY, DONALD B. (1981) *Professor, Chair, Computer Information Systems*
B.V.E., Cal State Los Angeles, 1971; M.A. CSU, 1972; Ed.D. Brigham Young Univ., 1976.

MEEKER, FREDERICK B. (1970) *Professor, Behavioral Sciences*
A.B., Occidental Coll., 1954; M.A., 1963; Ph.D., Claremont Grad. School, 1971.

MERCER, EDWARD K. (1968) *Professor, Biological Sciences*
B.A., UC Santa Barbara, 1958; M.A., 1962; Ph.D., Auburn Univ., 1968.
METWALLI, AHMED M. (1969) *Professor, English and Foreign Languages*
B.A., Cairo Univ., 1959; D.E.S., Trinity Coll., Dublin, 1961; Ph.D., State Univ. of N.Y., Albany, 1971.
MILLER, CRANE S. (1971) *Professor, Social Science*
B.A., U C L A, 1965; M.A., 1968; Ph.D., 1971.
MILLER, KAREN (1974) *Acting Athletic Director Coach, Physical Education*
B.A., Chapman College, 1965; M.P.E., Idaho St. Univ., 1972.
MILLER, RALPH H. (1979) *Assistant Professor, Operations Management*
B.A., UC Berkeley, 1967; M.A., San Jose State Univ., 1968; Ph.D., Claremont Graduate School, 1979.
MILLNER, CHARLES N., JR. (1972) *Professor, Chemistry Department*
B.S., Cal State Poly Univ., Pomona, 1967; M.S., 1971, Univ. of N. Mex.; Ph.D., 1972.
MOBLEY, PATRICK W. (1978) *Associate Professor, Chemistry*
B.S., UC Santa Barbara, 1965; Ph.D., UC San Diego, 1972.
MOISE, LAURIE LEE (1980) *Lecturer, Animal Science*
B.S., Cal State Poly. Univ., Pomona, 1976; M.S. 1979.
MOONEY, JAMES E. (1968) *Professor, Music*
B.A., Ariz. State Univ., 1952; M.A., 1953; Ph.D., Brigham Young Univ., 1968.
MOORE, JOHN A., JR. (1970) *Professor, Social Sciences*
B.A., Univ. of Tulsa, 1962; M.A., 1964; Ph.D., Claremont Grad. School, 1972.
MORALES, RAY (1961) *Professor, Civil Engineering*
B.S., Loyola Univ., 1960; M.S., Stanford Univ., 1961; Engineer's Degree, 1965.
MORAN, GABRIEL T. (1948) *Professor, Chemistry*
B.A., Whittier Coll., 1942.
MOREHOUSE, ROGER L. (1980) *Associate Professor, Physics*
B.A., Wabash College, 1960; Ph.D., Duke University, 1965.
MORGAN, JOHN C., II (1976) *Professor, Mathematics*
A.B., San Diego State University, 1964; M.A., UC Berkeley, 1968; Ph.D., 1971.
MORIARTY, DAVID J. (1976) *Associate Professor, Biological Sciences*
B.S., Univ. of Illinois, 1970; M.S., 1972; Ph.D., 1976.
MORRIS, G. S. DON (1978) *Professor, HPERD*
B.A., Rutgers Univ., 1968; M.S., Univ. of Montana, 1969; Ph.D., Univ. of Ore., 1974.
MORRIS, GLENDA M. (1968) *University Director of Affirmative Action Services; Counselor, Counseling and Testing*
B.A., Cal. State Univ., Los Angeles 1967; M.S., 1971.
MORSBERGER, ROBERT E. (1969) *Professor, English and Foreign Languages*
B.A., Johns Hopkins Univ., 1950; M.A., Univ. of Iowa, 1954; Ph.D., 1956.
MORTENSEN, WILLIAM E. (1982) *Associate Professor, Aerospace Engineering*
B.E.S., Brigham Young Univ., 1958; M.S., Univ. of Southern Calif., 1966.
MOSES, YOLANDA T. (1975) *Acting Dean, School of Arts, Associate Professor, Social Sciences*
B.A., Cal. State Coll., San Bernardino, 1968; M.A., U.C. Riverside, 1973; Ph.D., 1976.
MOSS, ANDREW I. (1980) *Assistant Professor, English and Foreign Languages*
B.A., UCLA, 1971; M.A., 1973; Ph.D., 1976.
MOSSUTO, JULIUS J. (1968) *Senior Assistant Librarian, Reference Department*
B.A., Univ. of Pittsburgh, 1949; M.S.L.S., U.S.C., 1965; M.A.T., Univ. of LaVerne, 1971.
MYERS, LEONHARD M. (1964) *Associate Professor, Industrial and Manufacturing Engineering*
B.A., Univ. of Mo., 1956; B.S.I.E., 1960; P.E.
NAKABA, KENNETH S. (1973) *Associate Professor, Landscape Architecture*
B.S., Cal State Poly Univ., Pomona, 1968; M.A., Pacific Oaks, 1978.
NELSON, EDWARD A. (1958) *Professor, Animal Science*
B.S., Utah State Univ., 1952; M.S., 1953; Ph.D., Kansas State Univ., 1958.
NESIN, DANIEL J. (1968) *Professor, Computer Science*
B.S., Columbia Univ., 1951; M.S., U.S.C., 1965.
NETT, C. ROBERT (1979) *Lecturer, Animal Science*
B.A., San Diego State Univ., 1961.
NEWBERRY, CONRAD F. (1964) *Professor, Aerospace Engineering*
B.E.M.E. Aero., U.S.C., 1957; M.S.M.E., Cal State Univ., Los Angeles, 1971; M.A., Ed., 1974; P.E.

NGUYEN, THUAN K. (1979) *Associate Professor, Chemical and Materials Engineering*
B.S., Cal State Poly Univ., Pomona, 1974; Ph.D., Princeton Univ., 1979.
NISE, NORMAN S. (1963) *Professor, Electrical & Computer Engineering*
B.S.E.E., Drexel Univ., 1960; M.S.E.E., Lehigh Univ., 1962.
NJUGUNA, SAMUEL (1980) *Assistant Professor, Finance, Real Estate and Law*
B.S., Cal State Univ., San Francisco, 1973; M.A., 1974; M.B.A., Claremont Graduate School, 1979
NOREEN, ALFRED E. (1982) *Associate Professor, Mechanical Engineering*
B.S.M.E., Univ. of Washington, 1945; M.S., Univ. of Illinois, 1951.
NULL, DAVID G. (1979) *Associate Professor, Behavioral Science*
B.S., SUNY New Paltz, 1970. Ph.D., 1981.
OGLE, CLAUDE B., JR. (1966) *Professor, Civil Engineering*
B.S.C.E., U.S.C., 1943; M.S.C.E., 1947; Engineer's Degree, 1976; P.E.
OKADA, VICTOR N. (1970) *Professor, English and Foreign Languages*
B.A., Univ. of Hawaii, 1964; M.A., N.Y. Univ., 1965; Ph.D., Ohio State Univ., 1973.
OLIVER, MARY JO (1972) *Professor, HPERD*
B.S., Okla. State Univ., 1950; M.H.P.E., No. Tex. State Univ., 1953; Ed.D., Okla. State Univ., 1973.
OLIVER, PATRICIA B. (1981) *Assistant Professor, Architecture B.A., UCLA, 1974; M. Arch., 1977.*
OLSON, JEFFREY K. (1974) *Associate Professor, Landscape Architecture*
B.L.A., U C Berkeley, 1965; M.L.A., Harvard Univ., 1971.
O'DONNELL, DEBORAH J. (1974) *Assistant Director, Financial Aid*
B.S., Cal Poly, Pomona, 1974.
O'NEIL, JOHN D. (1970) *Professor, Industrial & Manufacturing Engineering*
B.S., Boston Univ., 1962; M.E., Rensselaer Poly. Inst., 1963; Engineer's Degree in Industrial and Systems Engineering, U S C, 1976.
O'REILLY, PATRICK J. (1968) *Counselor*
B.S., Loyola Univ., L.A., 1953; M.S.W., U S C, 1955.
OURY, THOMAS H. (1966) *Counselor*
B.A., Pomona Coll., 1950; M.S., U S C, 1953; Ed.D., 1968.
PAL, BIJAY K. (1980) *Associate Professor,*
B.S., Calcutta University, 1962; M.S., 1964; Ph.D., 1969.
PALATNICK, BARTON (1968) *Professor, Physics*
B.A., Yale Univ., 1962; M.A., Columbia Univ., 1964; Ph.D., 1968.
PALMER, JOHN P. (1969) *Professor, Chair, Electrical & Computer Engineering*
B.S., Univ. of Mich., 1962; Ph.D., U C Riverside, 1970.
PARK, DAVID J. (1965) *Professor, Economics*
B.A., Claremont Men's Coll., 1957; M.A., U S C, 1959; Ph.D., 1962.
PARKER, ARTHUR F., JR. (1976) *Professor, Chair, Agricultural Business Management*
B.S., Clemson Univ., 1966; M.S.A., Univ. of Florida, 1968; Ph.D., 1973.
PARKER, VINCENT E. (1967) *Professor, Acting Chair, Physics*
A.B., Evansville Coll., 1936; Ph.D., Indiana Univ., 1940.
PARRY, DAVID L. (1980) *Professor, Finance, Real Estate and Law*
B.A., Cal State Univ., Los Angeles, 1965; M.A., U S C, 1967, Ph.D., U S C, 1976.
PARTIDA, GREGORY J., JR. (1975) *Professor, Plant and Soil Science*
B.S., Cal State Poly Univ., Pomona, 1965; M.S., U C R., 1969; Ph.D., 1971.
PATTEN GAYLORD P. (1969) *Professor, Plant and Soil Sciences*
B.S., Brigham Young Univ., 1963; M.S., Ohio State Univ., 1965; Ph.D., 1969.
PATTISON, SCOTT E. (1976) *Associate Professor, Chemistry*
B.A., U C Santa Cruz, 1969; M.S., Univ. of Washington, 1970; Ph.D., U C Riverside, 1975.
PERRY, ROBERT C., JR, (1972) *Professor, Acting Department Chair, Landscape Architecture*
B.S., Cal State Poly Univ., Pomona, 1969; M.L.A., U C, Berkeley, 1971.
PETERS, MARY B. (1957) *Director Child Care Center*
B.S., Cal Poly, Pomona, 1969.
PETERSON, RONALD M. (1967) *Professor, Political Science*
B.A., Brigham Young Univ., 1964; Ph.D., Claremont Grad. School, 1972.
PETIT, RUTH T. (1972) *Professor, Teacher Preparation Center*
B.A., La Verne College, 1964; M.A., Claremont Grad. School, 1968; Ph.D., 1972.

PFLUEGER, DONALD H. (1952) *Professor, History*
B.A., Pomona Coll., 1949; M.A., Stanford Univ., 1951.
PHILBRICK, JOSEPH L. (1960) *Professor, Behavioral Sciences*
B.A., Baylor Univ., 1949; M.A., 1950; Ph.D., 1955.
PHILLIPS, GLEN D. (1969) *Professor, Communication Arts*
B.A., Univ. of Mich., 1957; M.A., 1963; Ph.D., 1968.
PICCOLA, BOBBIE (1980) *Coordinator, On-Campus Recruiting/Career Counselor, The Career Center*
B.S., California State University, Fullerton, 1975, M.A., 1980.
PICKARD, EDWARD E. (1973) *Professor, Architecture*
B. Music Educ., Louisiana State Univ., 1952; B.S. and B.Arch., Georgia Institute of Technology, 1960; M.Env. Des., Univ. of Notre Dame, 1972.
PIDGEON, CHRISTOPHER W. (1979) *Associate Professor, Computer Information Systems*
B.S., CSPU, Pomona, 1976; M.B.A., CSPU, Pomona, 1980; C.D.P., 1976.
PIERCE, EDGAR C. (1981) *Director of News and Publications*
B.A., University of Michigan, 1945.
PINKUS, CHARLES E. (1980) *Associate Professor, Operations Management*
B.A., Rutgers Univ. 1960; M.S., Cornell Univ., 1962; D.Sc. George Washington Univ., 1971.
PINSON, EDWIN M. (1978) *Associate Professor, Drama*
B.A., Cal Poly State Univ., S.L.O., 1972; M.F.A., U C Davis, 1976.
PLATNER, GEORGE M. (1969) *Professor, Associate Director, Teacher Preparation Center*
B.A., U S C, 1947; M.S. in Ed. 1956; M.Ed., 1957; Ed.D., Baylor Univ., 1966.
POLITES, LOUIS (1979) *Associate Professor, Ornamental Horticulture*
B.S., Delaware Valley College, 1966; M.S., Univ. of Delaware, 1969; Ph.D., Univ. of Delaware, 1972.
POMERENING, JAMES A. (1965) *Professor, Plant and Soil Science*
B.S., Univ. of Wis., 1951; M.S., Cornell Univ., 1956; Ph.D., Ore. State Univ., 1961.
POWELL, REED M. (1974) *Professor, Management and Human Resources*
B.S., Brigham Young Univ., 1946; M.S., 1947; Ph.D., Michigan State, 1951.
PRICE, GEORGE A. (1972) *Professor, Ornamental Horticulture*
B.S., Univ. of Ore., 1958; M.S., 1965; Ph.D., Cal Western Univ., 1978.
PRITCHETT, SAMUEL L. (1982) *Professor, Acting Chair, Engineering Technology*
B.S., Indiana State Univ., 1949; M.S., Indiana Univ., 1951.
PUTNAM, DONALD F. (1979) *Professor, Accounting*
B.S., Babson College, 1962; M.B.A., UCLA, 1969, M.B.E., Claremont Grad. School, 1974; Ph.D., 1976; C.P.A.
PYE, EARL L. (1967) *Professor, Chemistry*
A.B., Cal State Univ., Chico, 1958; M.S., U C, Davis, 1961; Ph.D., La. State Univ., 1966.
QUANEY, ROBERT A. (1959) *Professor, Industrial and Manufacturing Engineering*
B.S., Stanford Univ., 1954; M.S., 1965; P.E.
QUINN, RONALD D. (1969) *Professor, Biological Sciences*
B.A., Cal State Univ., Northridge, 1965; Ph.D., Princeton Univ., 1969.
QURESHI, DONNA IVEN (1981) *Associate Professor, Marketing Management*
B.S. Lincoln Univ., 1966; M.S., St. Louis Univ., 1967; M.B.A., DePaul Univ., 1980; Ph.D., St. Louis Univ., 1970.
RADNITZ, ALAN (1970) *Associate Professor, Mathematics*
A.B., U C L A, 1966; Ph.D., 1970.
RAFIQUZZAMAN, MOHAMED (1978) *Associate Professor, Electrical and Computer Engineering*
B.S., Univ. of Engr. & Tech., Dacca, Bangladesh, 1969; M.S., Univ. of Windsor, Canada, 1972; Ph.D., 1974.
RAI, KAMTA (1978) *Associate Professor*
B.S., Univ. of Lucknow, India, 1963, M.S., 1965; M.S., McMaster Univ., Canada, 1973; Ph.D., Univ. of Wisconsin, Madison, 1978.
RAMALINGAM, PANCHATCHARAM (1970) *Professor, Industrial & Manufacturing Engineering*
B.E., Univ. of Madras, 1963; M.S.I.E., Ore. State Univ., 1969; Ph.D., 1973; P.E.
RATHMANN, CARL E. (1979) *Associate Professor, Mechanical Engineering*
B.S., Northwestern Univ., 1968; M.S., 1970; Ph.D., 1975.

RELF, WILLIAM B. (1976) *Professor, Management and Human Resources*
B.A., Univ. of Pittsburgh, 1959; M.B.A., Harvard Univ., 1961; M.Div., San Francisco Theological Seminary, 1966; Ph.D., Claremont Grad. School, 1971; C.M.A., 1979.
RICE, ELMER H. (1959) *Professor, Chemistry*
A.B., Whittier Coll., 1947; Ph.D., U S C, 1958.
RICHARDS, RICHARD C. (1964) *Professor, Social Sciences*
B.A., U C, Santa Barbara, 1957; M.A., U C L A, 1964.
RIDDLE, JEWEL M. (1959) *Professor, Accounting*
B.A., San Jose State Univ., 1951; C.P.A.
RIDGWAY, ARTHUR A. (1969) *Associate Professor, HPERD*
B.A., Emporia State Teachers' Coll., 1956; M.S., 1960; Ed.D., Univ. of Ark., 1970.
RITCHIE, JOHN W. (1976) *Director, Student Health Services*
B.S., Oregon State Univ., 1939; M.D., Univ. of Oregon Medical School, 1942; Diplomate American Board of Surgery, 1961.
RIVERS, LESLIE A. (1979) *Assistant Professor, Drama*
B.A., U C Davis, 1970; M.F.A., Stanford Univ., 1972.
ROBERTSON, D. MUZETTE (1973) *Associate Director, Financial Aid*
B.A., Univ. of La Verne, 1970.
ROBERTSON, RICHARD A. (1969) *Associate Professor, Mathematics*
B.A., U C L A, 1966; M.A., 1968.
ROBINSON, LARRY K. (1968) *Professor, English and Foreign Languages*
B.S., Southeast Mo. State Coll., 1962; Diploome d'Etudes, Univ. de Grenoble, France, 1965; M.A., Univ. of Mich., 1967.
ROBINSON, MATI D. (1975) *Career Counselor, The Career Center; Student Affairs Assistant*
ROCHE, EDWARD T. (1959) *Professor, Biological Sciences*
B.A., San Diego State Univ., 1948; M.S., U S C, 1953; Ph.D., 1957.
ROEDER, WALTER H. (1968) *Librarian, Reference Department*
B.S., S U N Y Buffalo, 1950; M.S., Syracuse Univ., 1954; M.A., Claremont Grad. School, 1974.
ROSE, ERNEST D. (1977) *Professor, Communication Arts*
B.A., U C L A, 1949; M.A., 1951; Ph.D., Stanford Univ., 1964.
ROSENKRANTZ, PHILLIP R. (1982) *Associate Professor, Industrial and Manufacturing Engineering*
B.M.E., General Motors Inst., 1972; M.S.I.A., Purdue Univ., 1973; P.E.
ROSS, LEONARD E. (1972) *Professor, Operations Management*
B.A., U C Berkeley, 1955; Ph.D., 1964.
ROSSI, EVELYN (1972) *Director of Electronic and Media Resources; Professor, Teacher Preparation Center*
B.A., Pasadena College, 1952; M.A., Cal State Univ., Long Beach, 1967; Ed.D., U S C, 1971.
ROTH, FREDERICK (1979) *Associate Professor, Ornamental Horticulture*
B.S., UC Davis, 1968; M.S., 1969; Ph.D., Cornell Univ., 1978.
ROTH, GINA (1979) *Senior Assistant Librarian, Catalog Department*
B.A., U C L A, 1969; M.S.L.S., U S C, 1977.
RUEGGER, WERNER K. (1977) *Associate Professor Architecture*
B.Arch., College of Technology, Switzerland, 1982; M.Arch., UCLA, 1977.
ROWETT, JOHN C. (1978) *Director of Development*
B.A., University of Minnesota, 1952.
RUIZ, AURELIANO (1971) *Counselor*
B.A., Cal State Univ., Fullerton, 1968; M.S., 1975.
RUPPERT, ALVIN C. (1965) *Professor, Finance, Real Estate and Law*
B.A., Pomona Coll., 1951; M.B.A., Harvard Univ., 1953; Ph.D., U C R, 1974.
SABO, R. RICHARD (1967) *Professor, Acting Chair, Operations Management*
B.S. San Jose State Univ., 1965; M.B.A., 1966.
SAKAMOTO, SHIORI (1972) *Professor, Management and Human Resources*
B.S., U C Berkeley, 1962; M.B.A., 1969, D.B.A., U S C, 1975.
SANTILLAN, RICHARD A. (1980) *Assistant Professor, Acting Chair, Ethnic and Women's Studies*
B.S., CSU Los Angles, 1972; M.A., CSU Northridge, 1975; Ph.D., Claremont Graduate School, 1978.
SCARROW, RALPH M. (1976) *Professor, Hotel, Restaurant, and Travel Management*
B.S., Wayne State Univ., 1962; M.S., Niagara Univ., 1974; Ed.D., Univ. of La Verne, 1981.
SCHEITZACH, JOSEPH C. (1968) *Counselor*
B.A., U C L A, 1952; M.A., 1960; Ph.D., 1968.

SCHERER, ROGER (1979) *Associate Professor, Industrial and Manufacturing Engineeering*
B.S., Cal State Poly Univ., Pomona, 1964; M.A., Cal State Univ., Los Angeles, 1975.
SCHIPPERS, RICHARD H. (1968) *Professor, Industrial & Manufacturing Engineering*
B.S., Mich. State Univ., 1951; M.S., Cal State Univ., Los Angeles, 1967; P.E.
SCHLEIFER, HAROLD B. (1981) *Associate Director, Library*
B.A., Cuny, 1963; M.S.L.S., Columbia Univ., 1965.
SCHMITZ, GEORGE W. (1961) *Professor, Plant and Soil Science*
B.S., Univ. of Ariz., 1948; M.S., 1950; Ph.D., Ohio State Univ., 1952.
SCHNEIDER, KENNETH J. (1961) *Professor, Chair, Mechanical Engineering*
B.S.M.E., U S C, 1958; M.S.M.E., 1961; Engineer's Degree in Mechanical Engineering, 1970.
SCHNEIDER, ROBERT R. (1966) *Professor, Chair, Civil Engineering*
B.S., Univ. of N.M., 1944; M.S., U S C, 1950; Engineer's Degree in Civil Engineering, 1956; P.E.
SCHOENWETTER, EARL E. (1960) *Professor, Engineering Technology*
B.S., Univ. of Wis., 1957; M.S., Cal State Univ., Los Angeles, 1975.
SCHONING, RICHARD H. (1963) *Professor, Operations Management*
A.B., U C Berkeley, 1943; M.B.A., Wharton School, Univ., of Pa. 1959.
SCHWIEDER, ROBERT M. (1966) *Professor, Behavioral Sciences*
B.A., U S C 1959; M.A., 1965.
SCOLINOS, JOHN H. (1960) *Professor, HPERD*
B.S., Pepperdine Coll., 1950; M.S., U S C, 1952.
SCOTT, GARLAND E., JR. (1978) *Professor, Chemical and Materials Engineering*
B.S., N. Carolina State Univ. 1961; M.S., 1965; Ph.D., 1972.
SEEVERS, JOHN (1977) *Associate Professor, Mechanical Engineering*
B.S., U C Davis, 1968; M.S., 1969; Ph.D., 1971; P.E.
SEIBERT, KATHERINE B. (1963) *Associate Dean, School of Business Administration; Professor, Management and Human Resources*
B.A., N.M. Highlands Univ., 1948; M.A., 1951; M.A., U C L A, 1970; Ph.D., 1975.
SENN, ALAN R. (1974) *Professor, Accounting*
B.B.A., Univ. of Wash., 1954; M.B.A., 1961; Ph.D., U C L A, 1970; C.P.A.
SHAFFER, RALPH E. (1963) *Professor, History*
A.B., U C L A, 1951; M.A., U C Berkeley, 1955; Ph.D., 1962.
SHAFIA, FRED (1964) *Professor, Biological Sciences*
B.S., Cal Poly State Univ., SLO, 1957; M.S., Brigham Young Univ., 1960; Ph.D., Univ. of Neb., 1963.
SHAPIRO, MILTON M. (1962) *Professor, Economics*
A.B., Brooklyn Coll., 1943; Ph.D., U S C, 1963.
SHARP, GERALD D. (1976) *Professor, Chair, Animal Science*
B.S., Univ. of Idaho, 1955; M.S., 1962; Ph.D., Wash. State Univ., 1969.
SHEETS, G. FRED (1978) *Associate Professor, Engineering Technology*
B.S., Univ. of Texas, 1950; M.S., Texas A & M Univ., 1952; P.E.
SHELDON, ALFRED E., JR. (1966) *Professor, Communication Arts*
B.S., U.S. Military Academy, 1955; M.A., Wash. State Univ., 1963.
SHELTON, MICHAEL T. (1981) *Associate Professor, Mechanical Engineering*
B.S.A.E., Cal Poly, Pomona, 1967; M.S.A.E., USC, 1970; M.S.M.E., USC, 1972.
SHENG, HENRY P. (1978) *Professor, Chemical and Materials Engineering*
B.S., Univ. Of Maine, 1954; M.S., Purdue Univ., 1958; Ph.D., Univ. of Oklahoma, 1968; P.E.
SHIEH, JOHN T. (1967) *Professor, Chair, Economics*
B.S., Chunghsing Univ., 1956; M.S., Kansas State Univ., 1960, D.B.A., USC, 1981.
SHOLTIS, RICHARD F., Jr. (1981) *Associate Professor, Mechanical Engineering*
B.S.M.E., USC, 1958; M.S.M.E., USC, 1965.
SHOWGHI, DARIOUCHE G. (1973) *Associate Professor, Architecture*
B.Arch., Coll. of Arch., Amsterdam, 1963; M.Arch., 1967.
SHRAGER, SIDNEY (1960) *Professor, English and Foreign Languages*
B.A., U S C, 1949; M.A., U C L A, 1951; Ph.D., U S C, 1979.
SHUPE, DONALD V. (1968) *Professor, Behavioral Sciences*
B.A., Humboldt State Univ., 1962; M.A., 1967; Ph.D., Claremont Grad. Sch., 1968.
SIBBALD, PETER (1977) *Associate Professor, Finance, Real Estate and Law*
B.S., Technical Univ. of Delft, 1958; M.A. Sc. Univ. of Toronto, Canada, 1959; M.B.A., Claremont Grad. School, 1974; Ph.D., 1977.

SIEGEL, BEN (1957) *Professor, English and Foreign Languages*
A.B., San Diego State Univ., 1948; M.A., U C L A, 1950; Ph.D., U.S.C., 1956.
SIMON, ROBERT L. (1973) *Associate Professor, Music*
B.A., New York Univ., 1951; M.A., San Francisco State Coll., 1955; Ph.D., U C L A, 1975.
SIMONS, RONALD R. (1969) *Director of Public Affairs*
B.S., Calif. State Poly. Univ., Pomona, 1964 and 1969; M.B.A., Pepperdine Univ., 1978.
SIMPSON, ERNEST (1968) *Professor, Chemistry*
B.S., Univ. of N.M., 1963; M.S., 1966; Ph.D., 1967.
SISNEY, MARY F. (1980) *Assistant Professor, English and Foreign Languages*
B.S., Northwestern Univ., 1971; M.A., USC, 1974; Ph.D., 1979.
SKOUSEN, OWEN K. (1960) *Professor, Electrical & Computer Engineering*
B.A., U C L A, 1949; M.S., Stanford Univ., 1950; Engineer's Degree, 1952.
SLAVEN, NANCY C. (1971) Assistant Director, The Career Center
B.S., Niagara University, 1954; M.A., California State Polytechnic University, Pomona, 1976.
SMITH, CAROL A. (1980) *Assistant Professor, Mathematics*
B.A., San Francisco State Univ., 1967; M.S., California State Univ., Los Angeles, 1977; Ph.D., University of Texas, Austin, 1979.
SMITH, DAVID R. (1970) *Professor, Chair, History*
B.A., David Lipscomb Coll., 1964; M.A., Vanderbilt Univ., 1966; Ph.D., Univ. of Pa., 1968.
SMITH, DONALD D. (1965) *Professor, Chemistry*
B.S., Univ. of Okla., 1947; M.S., 1948; Ph.D., Purdue Univ., 1953.
SMITH, LAURA DUCLOS (1968) *Associate Librarian, Reference Department*
B.A., U C L A, 1952; M.S.L.S., U S C, 1962; M.A., Cal State Univ., Los Angeles, 1968.
SMITH, RICHARD H. (1960) *Professor, Computer Information Systems*
B.S., M I T, 1948; M.B.A., Northwestern Univ., 1954; C.D.P.
SMITH, V. MERRILINE (1972) *Professor, Chair, Mathematics*
B.A., Cal State Coll., San Bernardino, 1967; M.S., U C Riverside, 1969; Ph.D., 1972.
SMITH, WILLIAM A. (1964) *Professor, History*
B.A., Cal State Univ., Fresno, 1953; M.A., Claremont Grad. School, 1960; Ph.D., 1965.
SORENSEN, GALE (1973) *The Career Center*
B.A., California State University, Fullerton, 1974.
SPERRY, PAMELA J. (1977) *Associate Professor, Biological Sciences*
B.A., Univ. of Texas, 1963; M.S., Syracuse Univ., 1967; Ph.D., Rice Univ., 1973.
STABOLEPSZY, ANN (1979) *Associate Professor, HPERD*
B.A., U C L A, 1975; M.A., 1977.
STALLINGS, DALE G. (1964) *Professor, Economics*
B.S., Univ. of Idaho, 1950; M.S., Univ. of Minn., 1952; Ph.D., 1962.
STANLEY, EMILO J. (1969) *Professor, Social Sciences*
B.A., Univ. of Mich., 1955; M.A., 1957; Ph.D., 1967.
STAPLETON, CHARLES R. (1973) *Professor, Urban Planning*
B.A., U C L A, 1949; M.A., 1952.
STARK, CHARLES M. (1967) *Professor, Agricultural Engineering*
B.S., Cal Poly State Univ., SLO, 1960; M.A., Calif. State Univ., Los Angeles, 1972; Ed.D., Brigham Young Univ., 1976.
STARNES, F. SIGNE (1971) *Professor, Social Work*
B.A., Louisiana State Univ., 1948; M.S.W., 1950; M.Ed., U C Berkeley, 1968; Ph.D., U.S. Int'l. Univ., 1974.
STAVROS, GEORGE (1971) *Professor, English and Foreign Languages*
B.A., Lafayette Coll., 1959; M.A., Columbia Univ., 1964; Ph.D., Univ. of Wis., 1972.
STEELE, DAVID F. (1973) *Professor, Biological Sciences*
B.A., Drake Univ., 1961; M.A., 1963; Ph.D., U S C, 1970.
STEVENSON, DARLENE (1976) *Coordinator of Residence Life*
B.A., Univ. of Redlands, 1973; M.A., UC Riverside, 1976.
STEWART, GLENN R. (1963) *Professor, Biological Sciences*
B.S., Cal Poly State Univ., SLO, 1958; M.A., Ore. State Univ., 1960; Ph.D., 1963.
STIEHL, JIM (1981) *Associate Professor, HPERD*
B.S., Rutgers Univ., 1968; M.S., UCLA, 1974; Ph.D., 1977.
STIFFLER, DANIEL F. (1975) *Associate Professor, Biological Sciences*
B.A., UC Santa Barbara, 1968; M.S., Oregon State Univ., 1970; Ph.D., 1972.

STODDER, JOSEPH (1968) *Professor, English and Foreign Languages*
A.B., Spring Hill Coll., 1950; M.A., Loyola Univ., 1959; Ph.D., U S C, 1964.
STOLL, A. George (1980) *Professor, Chemical and Material Engineering*
B.S., Colo. School of Mines, 1967; M.S., UC Berkeley, 1969; Ph.D., 1973; P.E.
STONE, JOICS B. (1961) *Professor, Behavioral Sciences*
A.B., Brigham Young Univ., 1947; M.S., Univ. of Utah, 1950; Ph.D., 1952.
STONER, MARTIN F. (1967) *Professor, Biological Sciences*
B.S., Cal State Poly Univ., Pomona, 1963; Ph.D., Wash. State Univ., 1967.
STULL, ROBERT B. (1947) *Professor, HPERD*
A.B., Whittier College, 1941; M.A., 1947.
STUMPF, ROBERT V. (1968) *Professor, Computer Information Systems*
B.A., San Jose State Univ., 1961; M.S., Stanford Univ., 1968; M.B.E., Claremont Grad. School, 1972; Ph.D., 1975, C.D.P.
SUAREZ, CECILIA COTA-ROBLES (1972) *Professor, Teacher Preparation Center*
B.A., Univ. of Ariz., 1952; M.A., Cal State Univ., Los Angeles, 1970; Ed.D., U C L A, 1976.
SUAREZ, MARIO R. (1970) *Assistant Professor, Ethnic and Women's Studies*
B.A., Univ. of Ariz., 1952.
SUTER, RICHARD W. (1967) *Professor, English and Foreign Languages*
B.A., UC Santa Barbara, 1964; M.A., San Francisco State Univ., 1967; Ph.D., U S C, 1976.
SUTHERLAND, RODNEY D. (1960) *Professor, Chair, Aerospace Engineering*
B.S., U C L A, 1952; M. S., 1953.
SUTTON, ARTHUR W., JR. (1961) *Professor, Electrical & Computer Engineering*
B.S.E.E., Rose-Hulman Inst. of Tech., 1956; M.S., UC Irvine, 1970; P.E.
SUTTON, JAMES E. (1964) *Professor, Economics*
B.S., Univ. of Wis., 1955.
SZIJJ, LASZLO J. (1963) *Professor, Biological Sciences*
B.A., Univ. of Sciences, Budapest, 1954; M.A., 1955; Ph.D., Univ. of Toronto, 1963.
TAPP, D. RODNEY (1966) *Professor, Landscape Architecture*
B.S.L.A., Mich. State Univ., 1964; M.S.L.A., 1966.
TARMAN, DONALD W. (1973) *Professor, Chair, Earth Sciences*
B.S., Iowa State University, 1960; M.S., 1967; Ph.D., Univ. of Ariz., 1975.
TASSONEY, JOSEPH P. (1981) *Associate Professor, Chemical and Materials Engineering*
B.S., Univ. of Pittsburgh, 1949; M.S., Newark College of Engr., 1955; P.E.
TAYLOR, CHARLES L. (1969) *Professor, Marketing Management*
B.S., U C L A, 1962; M.B.A., 1964.
TAYLOR, HALSEY P. (1967) *Professor, English and Foreign Languages*
A.B., Colo. Coll., 1943; M.A., U S C, 1952; Ph.D., Claremont Grad. School, 1964.
TAYLOR, STANLEY H. (1969) *Professor, Communication Arts*
B.A., Mich. State Coll., 1951; M.A., Univ. of Mich., 1957; Ph.D., Mich. State Univ., 1967.
TEAGUE, LAVETTE C., Jr. (1981) Professor, Computer Information Systems
B.A., Mass. Inst. of Technology, 1957; M.S.C.E., Mass. Inst. of Technology, 1965; Ph.D., Mass. Inst. of Technology, 1968.
TEGHTMEYER, LEO H. (1969) *Professor, HPERD*
B.S., Iowa State Univ., 1959; M.S., Central Mo. State Univ., 1965; Ph.D., Univ. of Oregon, 1970.
TENNANT, FRANK A. (1955) *Professor, Communication Arts*
B.A., U C L A, 1950; M.S., 1953.
TESTERMAN, WARD D. (1971) *Professor, Computer Information Systems*
B.S., U S C, 1968; M. S., 1969; D.B.A., 1975.
THOMAS, FELICIA F. (1982) *Assistant Professor, Behavioral Sciences*
B.S., USC, 1974; M.A., 1977; Ph.D., 1978.
THOMPSON, ALVIN H. (1973) *Professor, Teacher Preparation Center*
A.B., Occidental Coll, 1949; M.A., UC Berkeley, 1953; Ed.D., 1965.
THOMPSON, BEN F. (1961) *Professor, Communication Arts*
A.B., Lycoming Coll., 1950; M.A., UC Berkeley, 1961.
THORNBURGH, PAUL A. (1962) *Counselor*
B.A., UC Santa Barbara, 1955; M.S., Cal State Univ., Los Angeles, 1966.

TILMANS, ANTHONY L. (1981) *Associate Dean, School of Engineering; Professor, Engineering Technology*
B.S., University of Pittsburgh, 1958; M.S., University of Pittsburgh, 1960; Ph.D., Carnegie-Mellon University, 1968.
TOMLINSON, JOHN L. (1969) *Professor, Chemical and Materials Engineering*
B.A., Loma Linda Univ., 1958; M.A., Univ. of Ore., 1961; Ph.D., Univ. of Wash., 1967.
TORRES, FRANK J. (1972) *Associate Professor, English and Foreign Languages*
B.A., St. Johns Coll., Ohio, 1966; M.Ed., Western Wash. State Coll., 1972.
TOTMAN, JANE M. (1979) *Associate Professor, Social Work*
B.A., Syracuse Univ., 1950; M.S.W., U C Berkeley, 1955; D.S.W., 1970.
TRACY, ELIZABETH K. (1974) *Associate Professor, Foods and Nutrition & Home Economics*
B.A., Cal State Univ., Los Angeles, 1966; M.A., 1973.
TRAN, CANH O. (1982) *Associate Professor, Electrical and Computer Engineering*
B.S.E.E., Cal Poly, San Luis Obispo, 1969; M.S.E.E., Cal State, Los Angeles 1974.
TREI, JOHN E. (1974) *Professor, Animal Science*
B.S., Univ. of Ill., 1961; M.S., Univ. of Ariz., 1963; Ph.D., 1966.
TRONCALE, LENARD R. (1970) *Professor, Biological Sciences*
B.S., Cal State Poly Univ., Pomona, 1966; Ph.D., Catholic Univ., Wash., D.C., 1970.
TROW, RUBY L. (1968) *Professor, Foods and Nutrition & Home Economics*
B.A., Cal State Univ., Los Angeles, 1964; M.A., Cal State Univ., Long Beach, 1968.
TROWBRIDGE, JAMES A. (1980) *Assistant Test Officer*
B.A., Cal State Univ., Long Beach, 1977; M.S., Cal State Univ., Long Beach, 1979.
TULLOCK, ROBERT J.(1976) *Associate Professor, Chair, Plant & Soil Science*
B.S., Cal Poly State Univ., S.L.O., 1967; M.S., Purdue, 1970; Ph.D., 1972.
TURNER, LYNN HIRST (1980) *Associate Professor, Management Human Resources*
B.A., Occidental College, 1966; M.S., Boston Univ., 1968; Ed.D., Indiana Univ., 1972.
TURNER, YVONNE L. (1977) *Associate Professor, Teacher Preparation Center*
B.A., Stowe Coll., 1952; M.A., New York Univ., 1957; Ed.D., U S C, 1977.
TUUL, JOHANNES (1965) *Professor, Physics*
B.S., Univ. of Sweden, 1955; M.A., 1956; M.S., Brown Univ., 1957; Ph.D., 1960.
UESUGI, TAKEO (1970) *Professor, Landscape Architecture*
B.S., Univ. of Osaka Prefecture, Japan, 1962; M.L.A., UC Berkeley, 1967; Ph.D., Landscape Architecture, Kyoto Univ., 1981.
VADI, JOSE M. (1971) *Professor, Political Science*
B.A., College of the City of N.Y., 1966; M.A., Univ. of Wis., 1967; Ph.D., 1976.
VIS, EUDELL G. (1980) *Assistant Professor, Agricultural Engineering*
B.S., Michigan State Univ., 1965; M.S., Michigan State Univ., 1967.
VOGEN, BLAINE (1969) *Professor, Civil Engineering*
B.S.C.E., Univ. of N. Dak., 1948; M.S.C.E., Cal. State Univ., Long Beach, 1970; P.E.
VOLLMAR, ARNULF (1965) *Professor, Chemistry*
B.S., Univ. of Tubingen, 1951; Ph.D., Univ. of Heidelberg, 1957.
VOLSKI, CHESTER A. (1959) *Professor, Landscape Architecture*
B.S., Mich. State Univ., 1956; M.L.A., Harvard Univ., 1957.
VON WODTKE, MARK J. (1969) *Professor, Landscape Architecture*
B.Arch., B.S., Rensselear Poly. Inst., 1966; M.L.A., UC Berkeley, 1969.
WAGNER, GERALD E. (1966) *Professor, Computer Information Systems*
B.A., Univ. of Northern Iowa, 1960; M.A., 1963; Ed.D., UCLA, 1973; C.D.P., C.D.P.A., C.D.E.
WALTERS, MOSES W. (1973) *Associate Director, Educational Opportunity Program*
B.S., Cal State Poly Univ., Pomona, 1971; M.S., 1973.
WANDERMAN, WENDY (1978) *Associate Professor, Electrical and Computer Engineering*
B.E., City Univ. of New York, 1967; M.S., New York Univ., 1973.
WANG, MARTIN I. (1959) *Professor, Communication Arts*
B.A., USC, 1949; M.A., 1950.
WARHURST, DONALD E. (1957) *Professor, HPERD*
B.A., UC Berkeley, 1943; M.S., USC, 1951.
WEAVER, DAVID R. (1980) *Assistant Professor, Architecture*
A.B., Brown University, 1972; M. Arch., UCLA, 1977.
WEBER, WARREN C. (1969) *Professor, Management and Human Resources*
B.S., De Paul Univ., 1958; M.B.A., 1964; Ed.D., Ariz. State Univ., 1969.

WEIDMAN, JAMES M. (1981) *Associate Professor, Agricultural Business Management*
B.A., University of Redlands, 1967; M.A., UCLA, 1969.
WEISEND, PAUL F. (1968) *Professor, Finance, Real Estate and Law*
B.A., Duquesne Univ., 1949; M.A., Miss. St. Univ., 1962; L.L.M., Cornell Univ., 1967; J.D., St. Mary's Univ., Tx., 1955.
WELCH, JOHN C., JR. (1965) *Physician II, Student Health Services*
B.S., UC Berkeley, 1952; M.D., USC, 1959.
WELLER, PAUL F. (1979) *Vice President for Academic Affairs, Professor, Chemistry*
B.S., Univ. of Ill., 1957; Ph.D., Cornell Univ., 1962.
WELLS, DONALD G. (1970) *Professor, Civil Engineering*
B.S., Loyola Univ., 1965; M.S., Stanford Univ., 1966; P.E.
WELLS, HAROLD F. (1954) *Director of the Library*
B.A., Univ. of British Columbia, 1951; M.L., Univ. of Washington, 1952.
WHALEY, STEPHEN V. (1970) *Associate Vice President for Faculty Affairs, Professor, English and Foreign Languages*
A.B., Hobart College, 1966; Ph.D., SUNY Buffalo, 1972.
WHALLEY, ELIZABETH A. (1981) *Assistant Professor, English and Foreign Languages*
B.S., Univ. of Wisconsin, 1965; M.A., San Francisco State Univ., 1971; Ph.D., Stanford University, 1976.
WHITE, SYLVIA (1977) *Associate Professor, Urban Planning*
B.A., UC Berkeley, 1959; M.S.C.R.P., USC, 1969.
WILDS, LILLIAN (1968) *Professor, English and Foreign Languages*
A.B., UCLA, 1962; M.A., 1964; Ph.D., 1970.
WILLARD, ROBERT E. (1976) *Professor, Accounting*
B.S., Northern Ariz. Univ., 1959; M.S., Arizona State Univ., 1963; Ph.D., Univ. of Arizona, 1968; C.M.A.
WILLIAMS, D. WAYNE (1967) *Dean, Continuing Education*
B.S., Cal State Poly Univ., Pomona, 1966; M.B.A., USC, 1967.
WILLIAMS, EDWIN H. (1960) *Professor, Mechanical Engineering*
B.S.M.E., UC Berkeley, 1959; M.S.M.E., USC, 1966; P.E.
WILLIAMS, JAMES H. (1979) *Associate Dean, School of Arts; Director, Learning Resources Center; Assistant Professor, Ethnic and Women's Studies*
B.A., Cal State Univ., Los Angeles, 1973; M.S. Pepperdine Univ., 1974.
WILSON, BRUCE E. (1963) *Professor, Political Science*
B.A., Univ. of Miami, 1960; M.A., 1966; Ph.D., Claremont Grad. School, 1974.
WILSON, HARRY A. (1960) *Assistant Professor, Mathematics*
B.S., USC, 1953; M.B.A., 1954.
WILSON, STANLEY C. (1973) *Professor, Art*
B.F.A., Otis Art Institute, 1969; M.F.A., 1971.
WINKLEY, DAVID (1975) *Associate Librarian, Reference Department and Collection Development*
B.A., UCLA, 1973; M.S.L.S., USC, 1975.
WINTERBOURNE, ROBERT J. (1953) *Counselor*
B.S., Cal Poly State Univ., SLO, 1950; M.A., 1952; Ed.D., UCLA, 1973.
WONG, GEORGE H. C. (1969) *Professor, History*
B.A., Lingnan Univ., 1949; M.A., Claremont Grad. School, 1951; Ph.D., Univ. of Wash., 1958.
WOODEN, WAYNE S. (1982) *Assistant Professor, Behavioral Sciences*
B.S., California State University, Chico, 1965; M.A., University of Pennsylvania, 1970; Ph.D., 1972.
WOOTTON, WILLIAM T. (1963) *Professor, Electrical & Computer Engineering*
B.S., U.S. Naval Acad., 1943; B.S.E.E., U.S. Naval Postgrad. Sch.; 1952; M.S., MIT, 1953.
WORLEY, G. DOW (1964) *Professor, Operations Management*
B.B.A., North Tex. State Univ., 1950; M.B.A., 1954.
WRIGHT, J. GARRARD (1962) *Professor, Industrial and Manufacturing Engineering*
B.S., Ore. State Univ., 1954; M.B.A., Univ. of Wash., 1966; P.E.
WU, JIA-HSI (1966) *Professor, Biological Sciences*
B.A., Nat. Taiwan Univ., 1950; M.A., Cornell Univ., 1952; Ph.D., Wash. Univ., 1958.
WYMER, JOSEPH P. (1961) *Professor, Acting Department Chair, Industrial & Manufacturing Engineering*
B.S.I.E., Va. Poly. Inst., 1947; M.S.I.E., USC, 1969; P.E.

WYSOCKI, ADOLPH A. (1974) *Professor, Animal Science*
B.S., Rutgers Univ., 1967; M.S., La. State Univ., 1969; Ph.D., Univ. of Kentucky, 1975.
YORK, RICHARD G. (1961) *Student Affairs Officer Director, Admissions and Records*
B.S., Cal Poly State Univ., SLO, 1950.
YOSHIKAWA, TOM T. (1962) *Professor, Ornamental Horticulture*
B.S., Cal Poly State Univ., SLO, 1950.
YOUNG, N. GREGORY (1976) *Associate Professor, Finance, Real Estate and Law*
B.A., Cal. State Univ., Los Angeles, 1970; J.D., Loyola Univ., School of Law, 1973.
YOUNG, LESTER C. (1977) *Associate Professor, Plant and Soil Science*
B.S., Cal State Univ., Los Angeles, 1968; M.S. Cal State Univ., Hayward, 1972; Ph.D., UC Berkeley, 1977.
YOUNG, RAIANN M. (1980) *Counselor*
B.S., Cal State Univ. SLO, 1959; MSW, Univ. of Southern California, 1976.
ZELL, DARRYL C. (1964) *Professor, Mechanical Engineering*
B.M.E., Univ. of Minn., 1958; M.S.E., UCLA, 1966.
ZIMMERMAN, BERNARD B. (1968) *Professor, Architecture*
B.Arch., UC Berkeley, 1953; M.S.C.R.P., USC, 1969.
ZRIMC, RUDOLF (1968) *Professor, English and Foreign Languages*
B.A., Western Reserve Univ., 1954; M.A., Harvard Univ., 1956; Ph.D., 1961.
ZULEBA, HOLLY L. (1979) *Financial Aid Counselor*
B.A., Univ. of Maryland; M.Ed., John Hopkins Univ., 1977.

EMERITI

KRAMER, ROBERT C. *President* (1966–1977)
LAMIMAN, JOHN F. *Professor, Biological Sciences* (1946–1966)
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FLYNN, THOMAS J. *Professor, Mathematics* (1959–1970)
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HOBBS, KENNETH R. *Professor, Agricultural Biology* (1950–1976)
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CANHAM, ALBERT E. *Professor, Plant and Soil Science (1948–1980)*

CATHERS, MARY WHITLEY *Professor, Human Resources and Small Business Management* (1961–1979)
CONARD, HAVEN QUIN *Professor, Agricultural Engineering* (1946–1979)
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NEWELL, LLOYD A. *Professor, Plant and Soil Science* (1956–1980)
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DEGRAFFENREID, EDNA *Library Assistant, Library* (1954–1979)
HAMMOND, AMELIA *Library Assistant, Library* (1962–1980)
SMOTHERS, MILDRED *Evaluations Technician, Evaluations* (1967–1978)
THOMAS, WILLIAM O., *Associate Professor, Electrical and Computer Engineering* (1960–1981)
FAUSCH, HOMER D., *Professor, Animal Science* (1956–1982)
ARMSTRONG, WILLIAM W., Jr., *Assistant Coordinator, Media Resources Center* (1960–1982)
BURMA, JOHN H., *Professor, Behavioral Science* (1969–1982)
FAUSCH, HOMER D., *Professor, Animal Science* (1956–1982)
MARSHALL, ROBERT D., *Associate Librarian, Library* (1957–1982)
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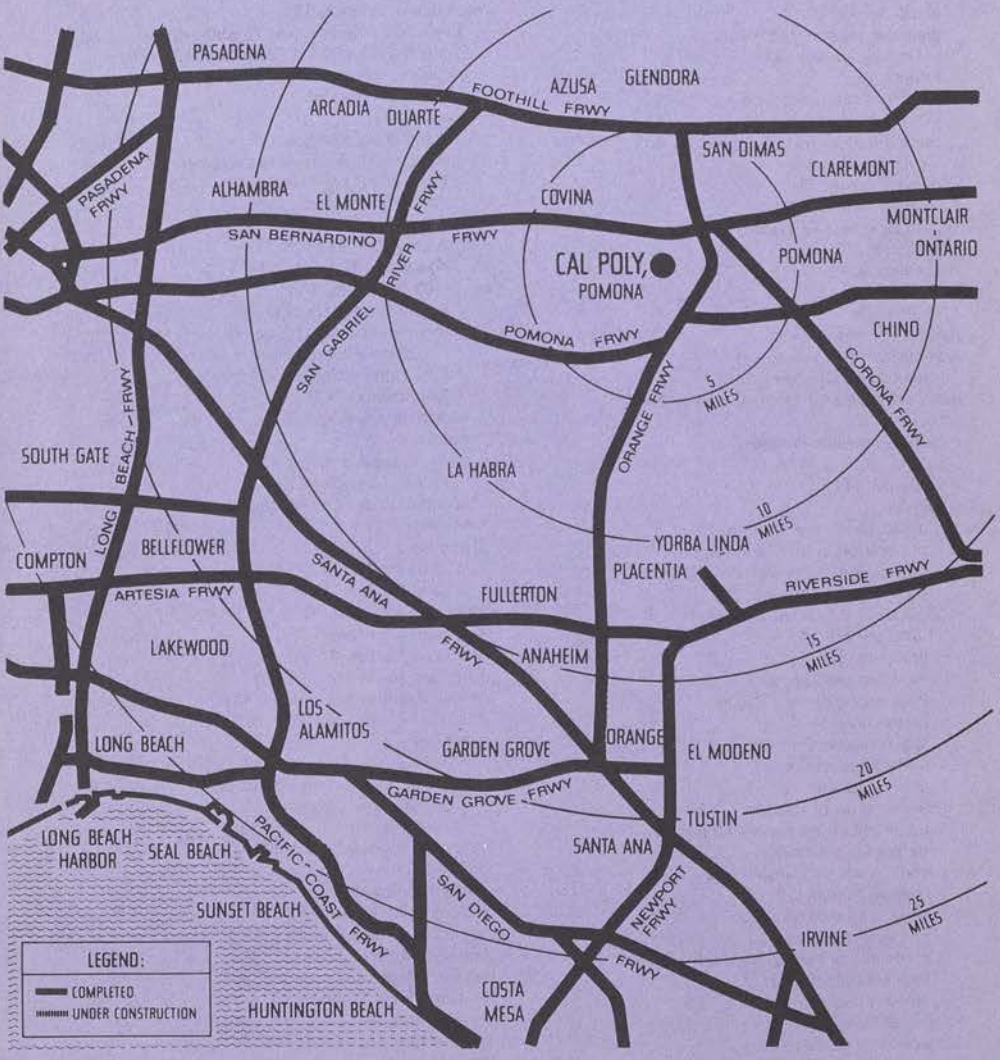
Freeways and Major Highway Routes leading to California State Polytechnic University, Pomona



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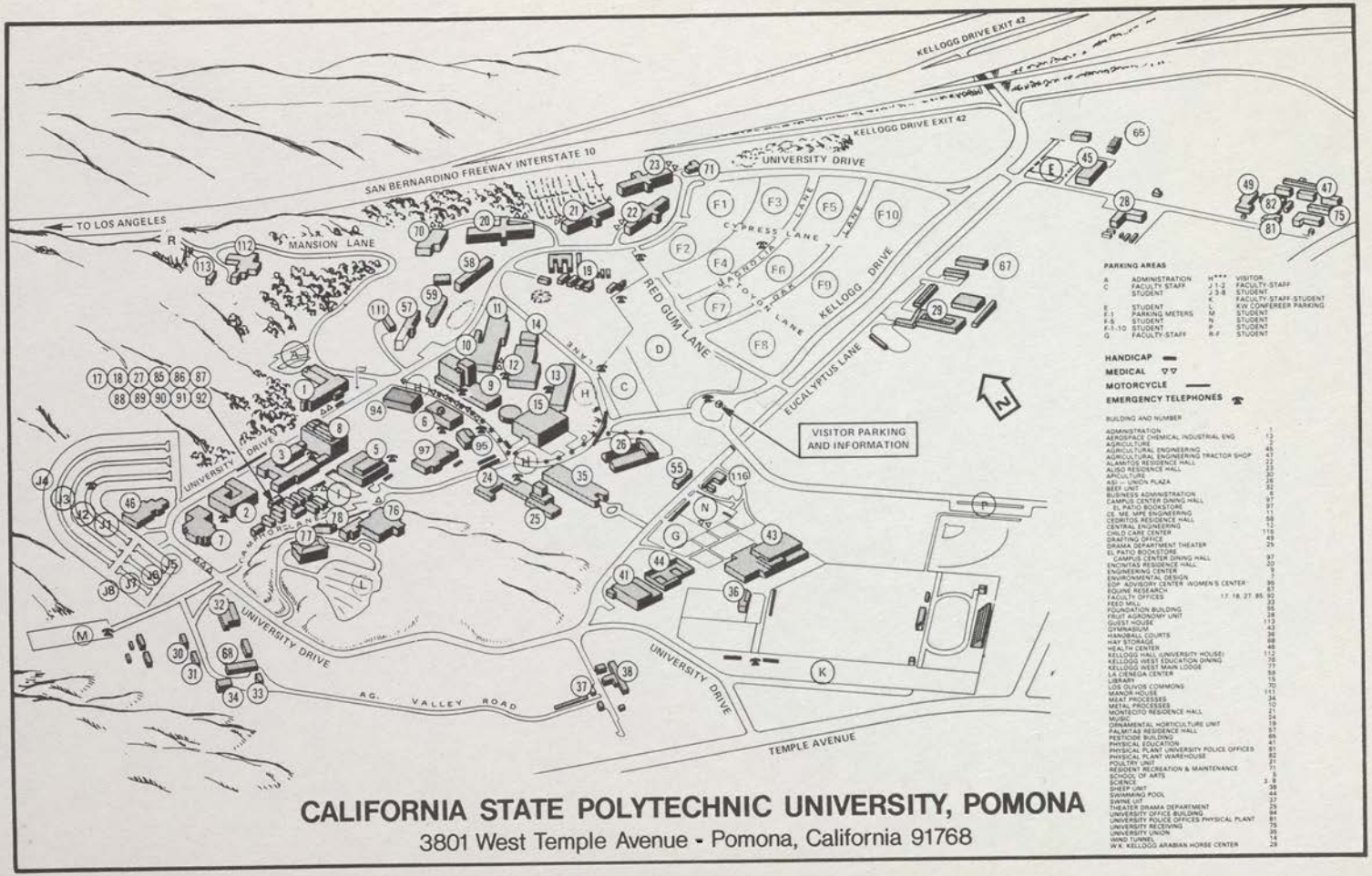

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