CAL POLY POMONA CATALOG

1990-91



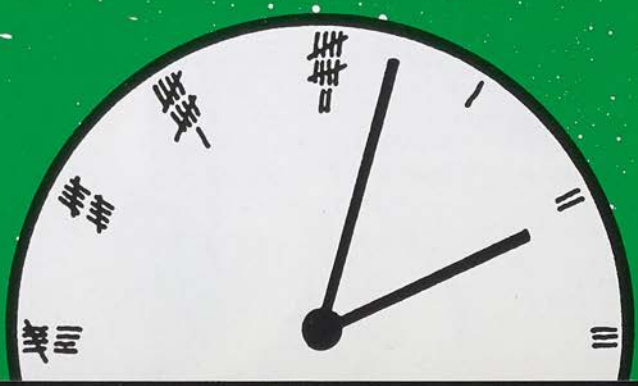
A Day in the Life of CAL POLY POMONA

Colleges

Agriculture
Arts
Business Administration
Engineering
Environmental Design
Science

Center for
Hospitality Management

School of Education



A time to work, a time to rest, a time to play...

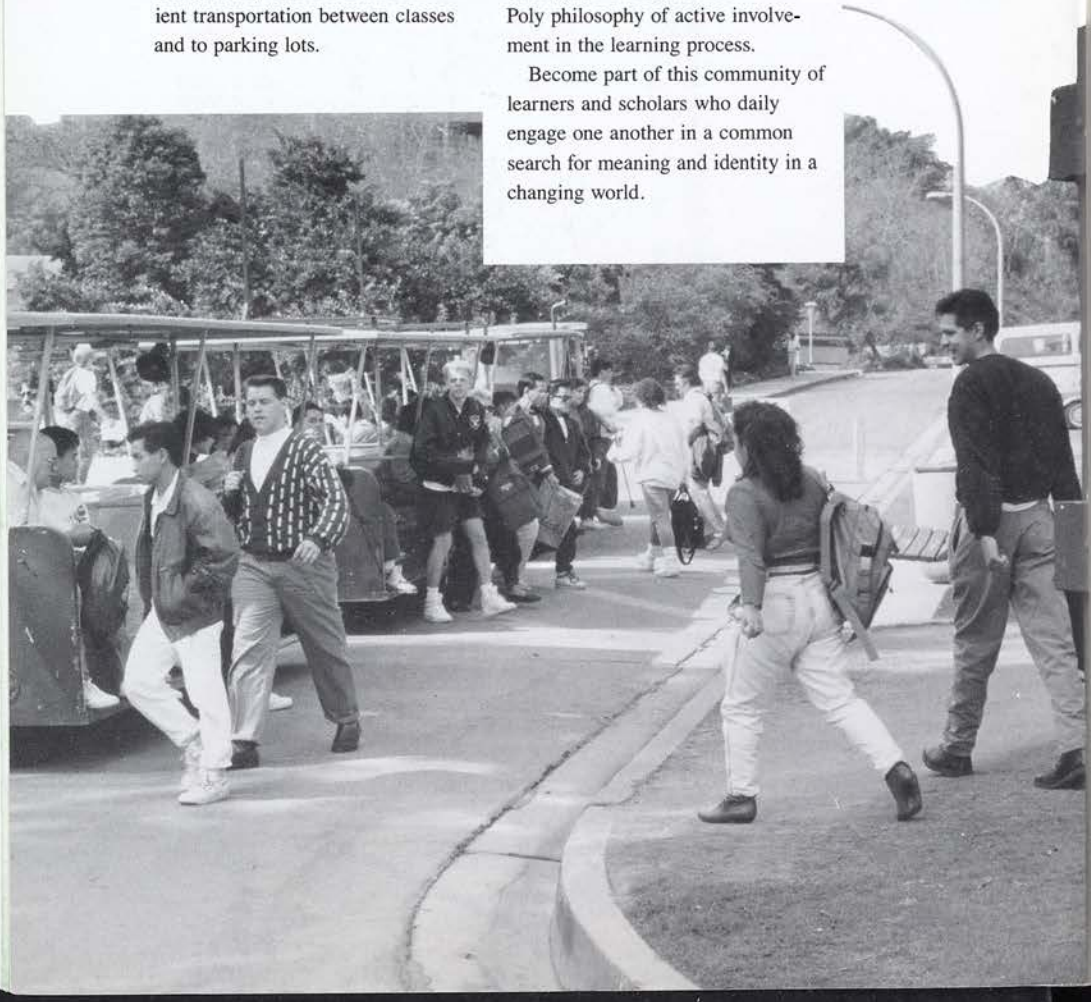
Waiting for the Tram. Although in acreage Cal Poly is one of the largest of the CSU campuses, getting about hasn't been as hard since trams, or Polywogens, appeared. Frequently passing key points on campus, they offer students convenient transportation between classes and to parking lots.

Each day at Cal Poly Pomona promises you an educational experience that you will remember and value for the rest of your life.

Foremost among Cal Poly's attractions are its academic and athletic programs, many of which are recognized nationally for their excellence. The faculty are highly qualified and exceptionally active professionally, while the staff are experienced, friendly, and willing to help you in any way possible. (For office and phone numbers see the "Call Us" page in this section.)

From the time you arrive on campus, whether it's for a morning, an afternoon, or an evening class or event, you will experience the Cal Poly philosophy of active involvement in the learning process.

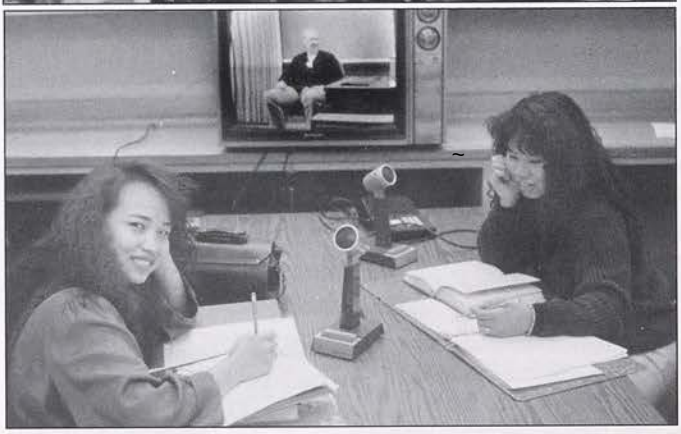
Become part of this community of learners and scholars who daily engage one another in a common search for meaning and identity in a changing world.



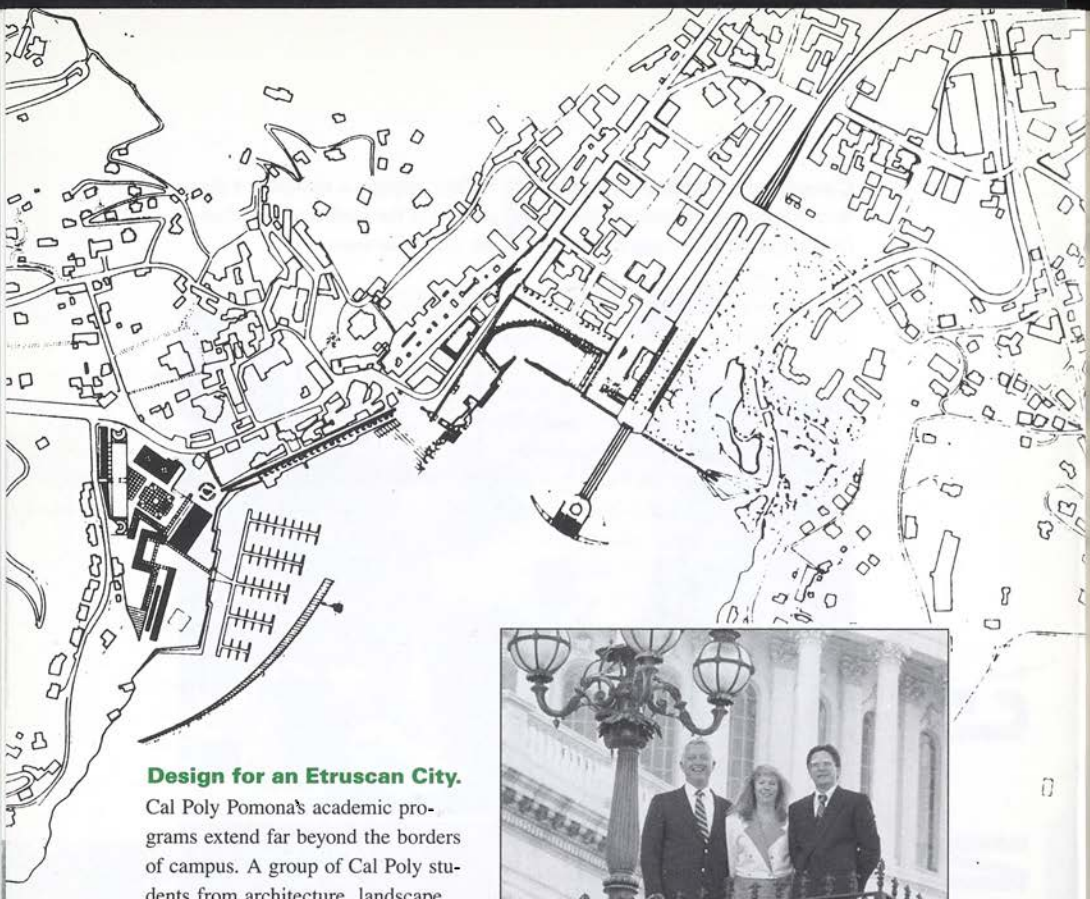
MORNING

Ceramic Sculpture Critique. Stan Wilson, Art Professor and Acting Director of the University Art Gallery, engages a student in a discussion of the work during a class in the Art Department.





PolyNet. Cal Poly's Young Scholar Program is a three-way partnership between the University, California public high schools, and interested high school students. Participants take university-level courses for credit using their own high school library as a classroom. PolyNet's "live" approach to instruction has advantages over recorded instructional programming. The students understand that the class is "live" television and that they may be called on at any time for a response. Students can also ask questions throughout the class. Many students who complete a course over Polynet subsequently enroll in a wide variety of institutions both in and out of California.



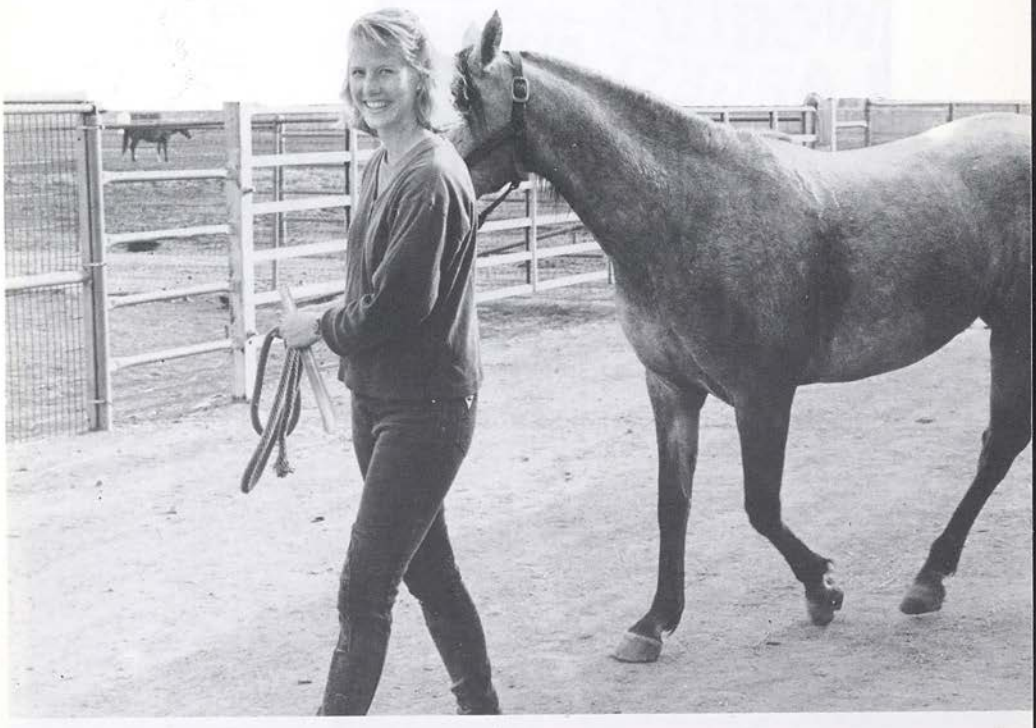
Design for an Etruscan City. Cal Poly Pomona's academic programs extend far beyond the borders of campus. A group of Cal Poly students from architecture, landscape design and urban/regional planning joined Italian students to produce a design proposal for the city of Laveno-Mombello in Italy. The challenges to each of the invited teams were to address the problem of harbor development, resolve the need for a major rail station and auto/bus ferry, seek alternative answers for the development of a large tract of land near the train station, and address the issue of vehicle and pedestrian movement with the city. The resulting proposal recommended the development of a park that would serve as the terminus of water and waste treatment, a ferry boat landing, a breakwater incorporating water aeration devices, and a new auto and rail terminal designed to minimize land coverage while forming a protective wall for the new park.



Washington Quarter. Shown are President Hugh O. La Bounty and Mr. Lee Godown, staff director, Government Operations Committee, House of Representatives. President La Bounty and Mr. Godown, a former Cal Poly student, established a "Washington Quarter" Internship Program for eligible Cal Poly students. Those selected under the program will learn about the legislative process by taking part in daily congressional office routines and by being assigned specific and well-defined projects.

M O

MORNING



Arabian Horses. In 1925, W.K. Kellogg built large stables around a training ring and courtyard and purchased his first horses from Poland, Egypt, Arabia, and England. The Kellogg Arabians soon became the third largest collection of Arabian horses in America, and the Kellogg Ranch one of the beauty spots and attractions of Southern California. Today this beautiful tradition continues, including shows that are now into their 64th year. The Equine Research Center is an important part of the Arabian horse program, as are the many students who train, care for, and ride these magnificent horses.

ORNING

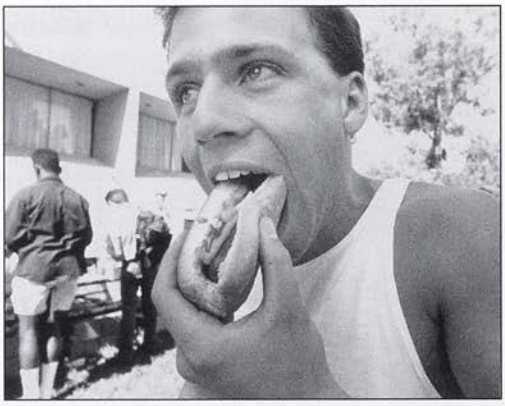




Life at Cal Poly means taking classes, writing papers, and studying for exams. But at times it also means fun, friends, and food. Pi Sigma Alpha, the Political Science National Honor Society, one of thirty such societies at Cal Poly, created the "world's largest burrito," providing not only food for thought, but also an entertaining diversion from the demands of courses and personal schedules.

N O

Hot Dog Party. Each year for the past five years Cal Poly's Annual Hot Dog Caper has greeted students returning to campus. The program provides a free lunch of hot dogs and Pepsi to everyone on campus, compliments of the Cal Poly Kellogg Unit Foundation, Inc., Associated Students, Inc., and PepsiWest.



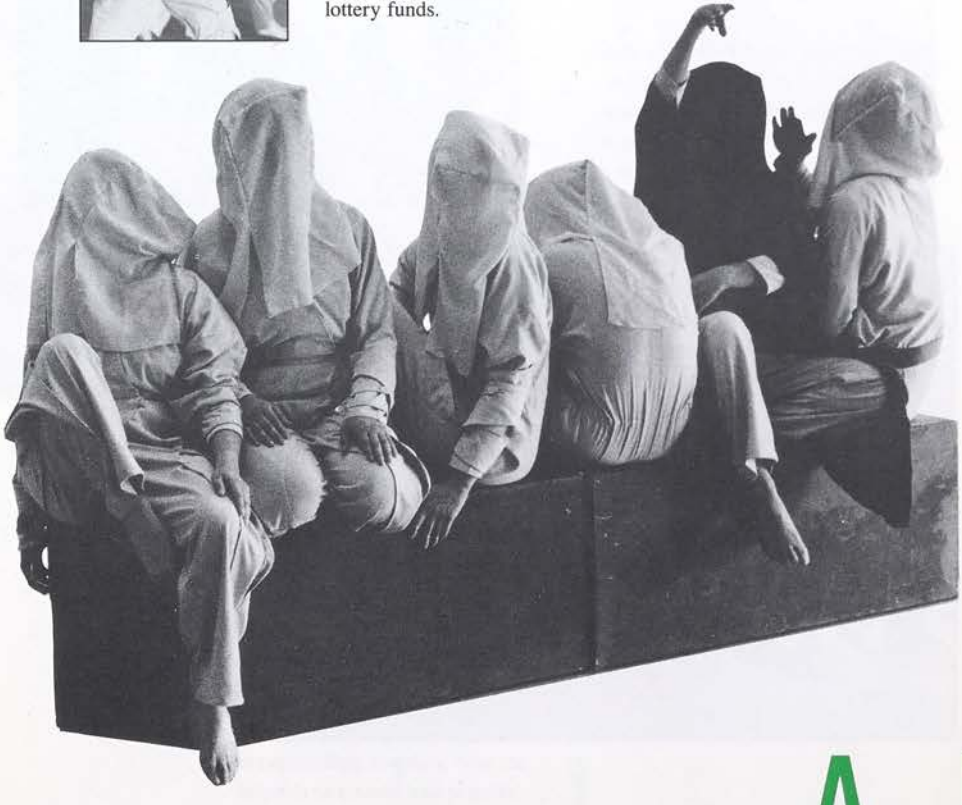
Students at Rest. Cal Poly's beautiful outdoor environment includes benches, tables, snack machines, and rest areas that invite students to relax, meet friends, or just "get away" for a while.



AFTERNOON

"A Voice in the Field." Department of Theatre and Dance students rehearse a multi-media production presented by the Department of Theatre and Dance and the College of Environmental Design at Cal Poly. Members of PrOject:DANce, a resident modern dance company, symbolize representative elements found in Japanese culture and Zen philosophy. Students from the College of Environmental Design created the set for "A Voice in the Field," which explores the balance of man, nature, and unknown forces. This cooperative project was supported by state lottery funds.





A F





The California Pre-Doctoral Program. An innovative new program with the potential for increasing the number of students who enter postsecondary teaching careers is jointly sponsored by the CSU and the University of California and funded by the California State Lottery. It is designed to encourage CSU minority, disabled, and women students to continue their studies at the doctoral level, specifically in disciplines where they are underrepresented. In Fall 1989, Cal Poly faculty members nominated four students for awards and served as their sponsors. Shown here are Dr. Don Hoyt, Professor of Biology, and biology major Christy Rice.

Comparing Artifacts. Upper division anthropology students in the anthropology/geography program examine bones, stones and implements from Native American sites with their professor, Dr. Dorothy Wills.

Visiting Trustee. Cal Poly College of Business Administration faculty and students have an opportunity to talk with Trustee Theodore J. Saenger. Since 1983, when the Trustee-in-Residence and Legislator-in-Residence programs were established at Cal Poly, several representatives from Congress, the State Legislature, and the Board of Trustees of The California State University have become more intimately acquainted with the round-the-clock activities of the University. Each guest spends two days on campus, meeting with students, faculty, and staff, participating in the life of the campus while following an agenda that reflects his or her own interests.



FTERNOON

EVENING

Sports at Cal Poly. Men's and women's sports at Cal Poly Pomona, particularly the basketball and baseball programs, but also tennis, track, and softball, have produced numerous all-star players, as well as regional and national champions. During the 1988–89 academic year twenty-three Bronco student athletes earned All-American honors, with three garnering individual national championships (Marvin Williams in the hammer throw; Durelle Schimek in the javelin, high jump and heptathlon; and Doris Williams in the 100-meter hurdles). The men's baseball team won national championships in 1976, 1980, and 1983, while the women's basketball team won national championships in 1982, 1985, and 1986. In 1990 the women's team, ranked No. 2 throughout the year, went to the NCAA Division II finals, taking third-place honors after losing to Delta State.





Rose Float. Preparing for the Tournament of Roses Parade has been part of the tradition at Cal Poly Pomona for forty-two years. The Rose Float began as an all-student endeavor between the two Cal Polys of Pomona and San Luis Obispo. Over the years Cal Poly's entries have received numerous awards, including the Founder's Trophy in 1989.

EVENING

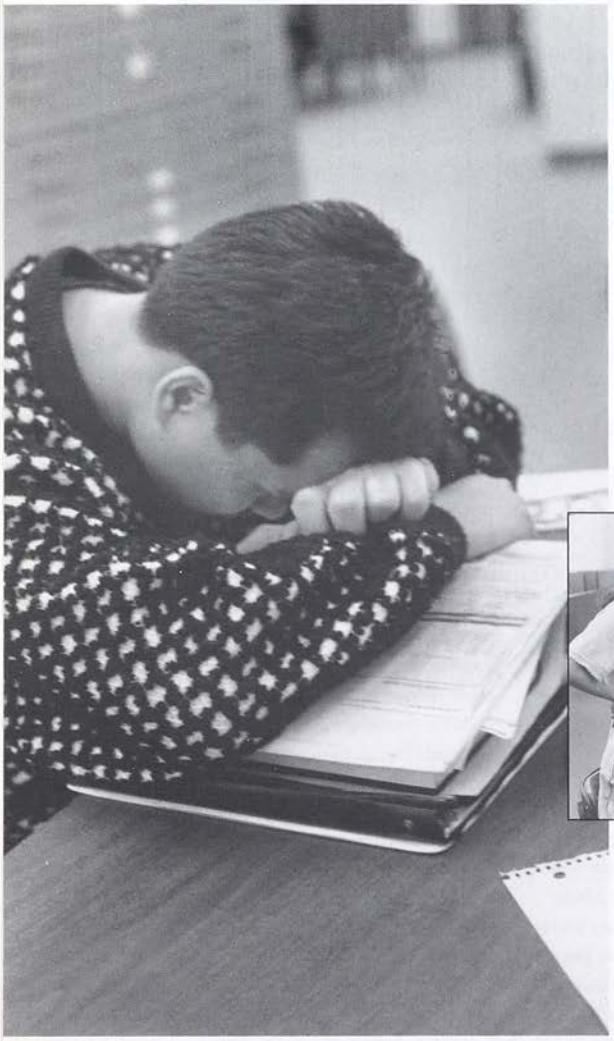




Fine Food. Cal Poly dedicated the new James and Carol Collins Center for Hospitality Management in February, 1990. The facility will ensure that when Hospitality Management students graduate they know and understand what a quality guest experience is, whether their management experience involves work at a fine dining restaurant, in contract food service, a resort hotel, or a fast food operation. The Center includes a demonstration and preparation kitchen, a beverage management laboratory, a lecture/demonstration theater, a computer laboratory, classrooms, conference rooms, a student lounge, and study areas.

Student Awards. President Hugh O. La Bounty and Vice President for Finance and Development Ruben Armiñana are shown presenting the President's Council Award to one of this year's winners. The program was established in 1983 as a means of recognizing academic and cocurricular excellence. Unlike most other scholarship awards at Cal Poly Pomona that may be based primarily on need, President's Council Scholars are selected solely on merit. Each year one student is chosen from each of the University's six colleges and from the Center for Hospitality Management.

M ID

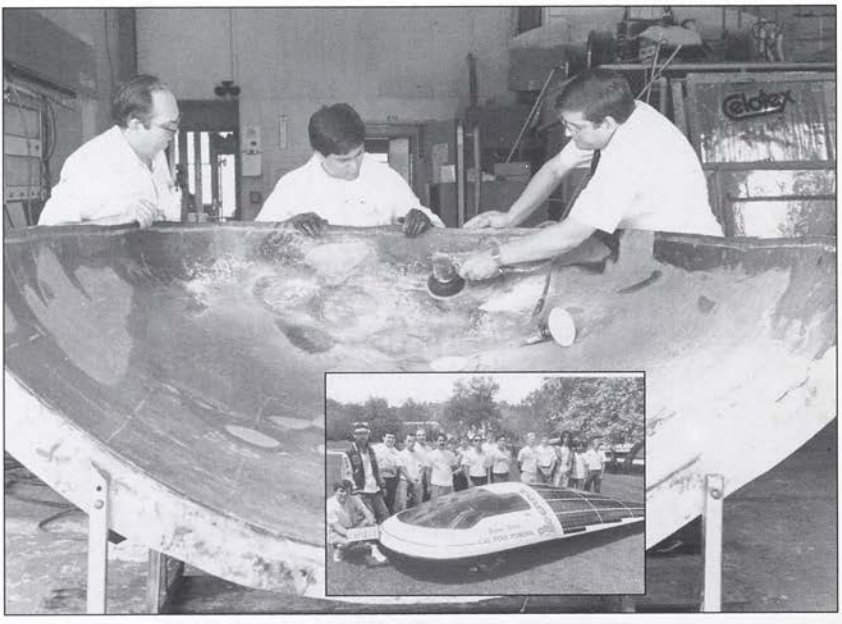


MIDNIGHT



Microfiche copiers are not the only research aids available to round-the-clock students. In 1989 the Library completed a two-story addition to its building which opened up more space for bound periodicals. Students may also use computers free of charge in the CD-ROM Reference Center. It contains bibliographic information on agriculture, business, psychology, education, and medicine.

D N I G H T





Solar Flair. Engineering, Business Administration, and Science student members of the Cal Poly Solar Energy Team (CaPSET) participated in the design, fabrication, and actual racing of our entry in the General Motors Sunrayce USA in summer 1990. The solar-powered car, Solar Flair, represents over 80,000 volunteer hours of effort.

The Solar Flair consists of a monocoque body of composite materials supporting thousands of photovoltaic cells. Computer-designed to minimize air resistance, it weighs less than 800 pounds. The inset shows the CaPSET team with the car on the day of the roll-out.

3D Picasso. First-year architecture students were asked to translate a painting into three dimensions as part of their foundation program.

ADMISSION How to Apply

Application forms for the CSU are available from the University and from high school and community college counselors. Application filing periods begin on November 1 for fall quarter, June 1 for winter quarter, August 1 for spring quarter, and February 1 for summer quarter of each academic year.

Prospective students must file a complete application, including official transcripts of all previous academic work attempted, as described in the application booklet. The 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 applied to another term. For further information call the Admissions Office (listed on the right.)

It is the policy of The California State University to support measures designed to prevent and eliminate discrimination on the basis of sex, physical ability, race, color, or national origin. The University offers special programs to meet the needs of low income students, underrepresented populations, disabled students, and special admissions. ■

CALL US

General Information 869-7659*

- Admissions 869-2000
- Advising Information and Deadlines 869-INFO
- Campus tours 869-3210
- Community College Articulation 869-3208
- Disabled Student Services 869-3333
- Educational Opportunity Program 869-3360
- Evaluations 869-3291
- Financial Aid 869-3700
- Housing 869-3307
- Orientation and Development Programs 869-3604
- Student Outreach and Recruitment 869-3210
- Testing Center 869-3353
- University Advising 869-3211

*All telephone numbers are in the 714 area code.

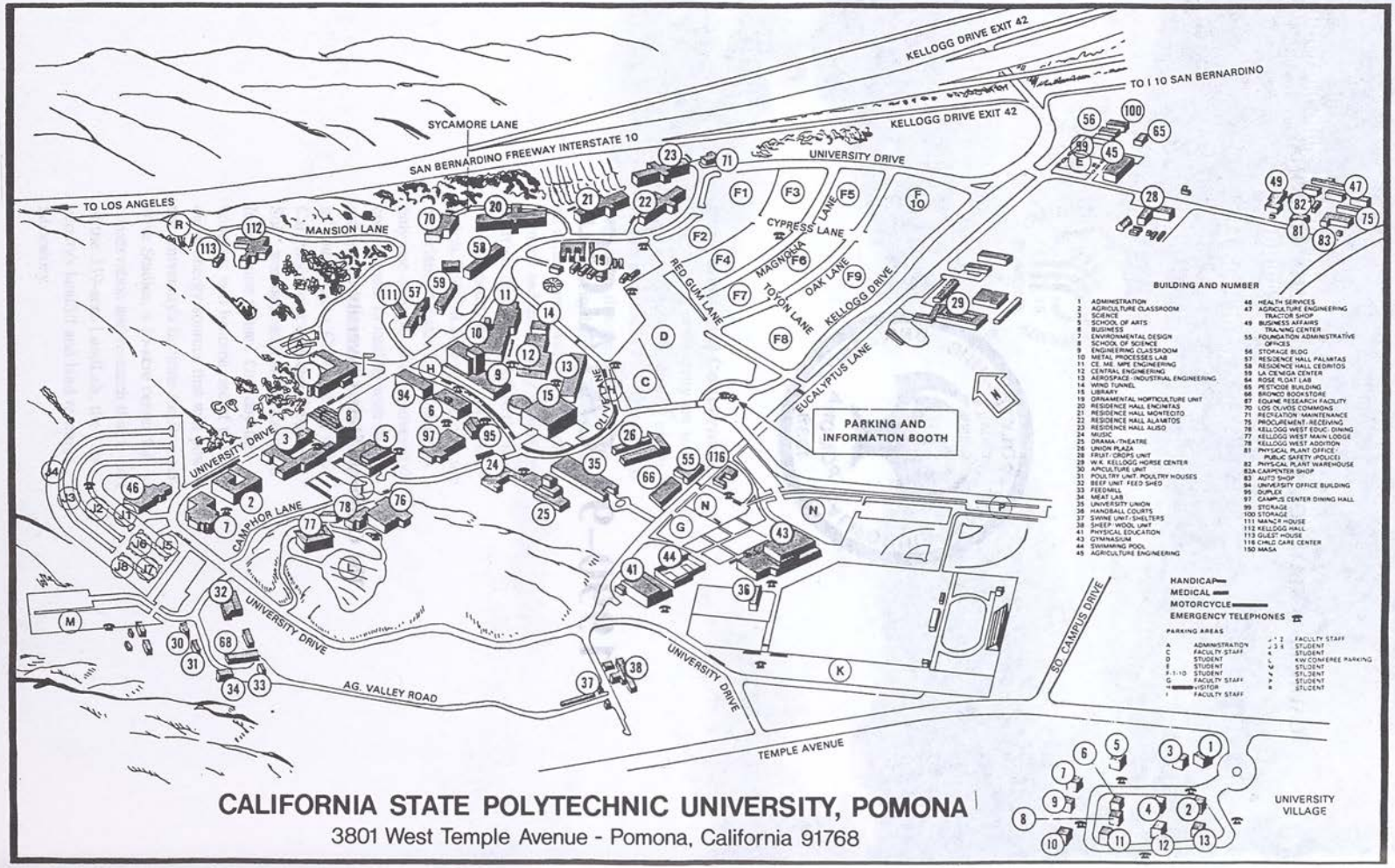
California State Polytechnic University, Pomona
Pomona, California 91768
714 869-7659

Environmental Concerns. Cal Poly students and faculty are seeking ways to improve the quality of life on this planet. Cal Poly Pomona has been doing this since 1965, when the University became involved in an arrangement with the City of Pomona and the County Sanitation Districts of Los Angeles in the use of reclaimed water for campus irrigation. But Cal Poly's pioneering use of reclaimed water for irrigation is only one example of the University's commitment to dealing with the significant environmental issues facing us hourly today. On April 16, 1990, Cal Poly's solar collector, "Super Sol," was dedicated at the LandLab Information Center. One day this collector will become one of the clean energy sources that will power the University's Institute for Regenerative Studies, a 16-acre center for conservation and research that is part of the 339-acre LandLab, the University's landfill and land resource laboratory.

CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

1990–91 CATALOG

The California State University



CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

3801 West Temple Avenue - Pomona, California 91768

Freeways and Major Highway Routes leading to California State Polytechnic University, Pomona

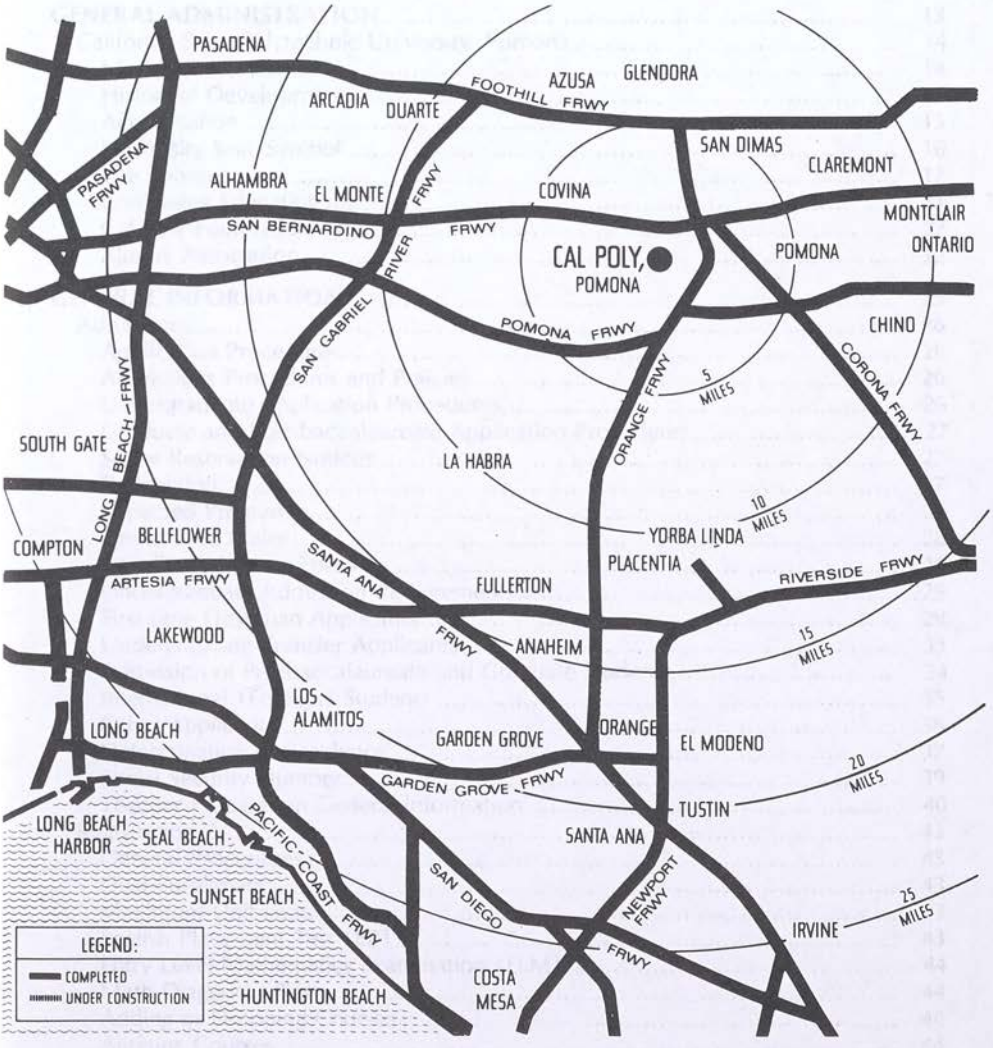




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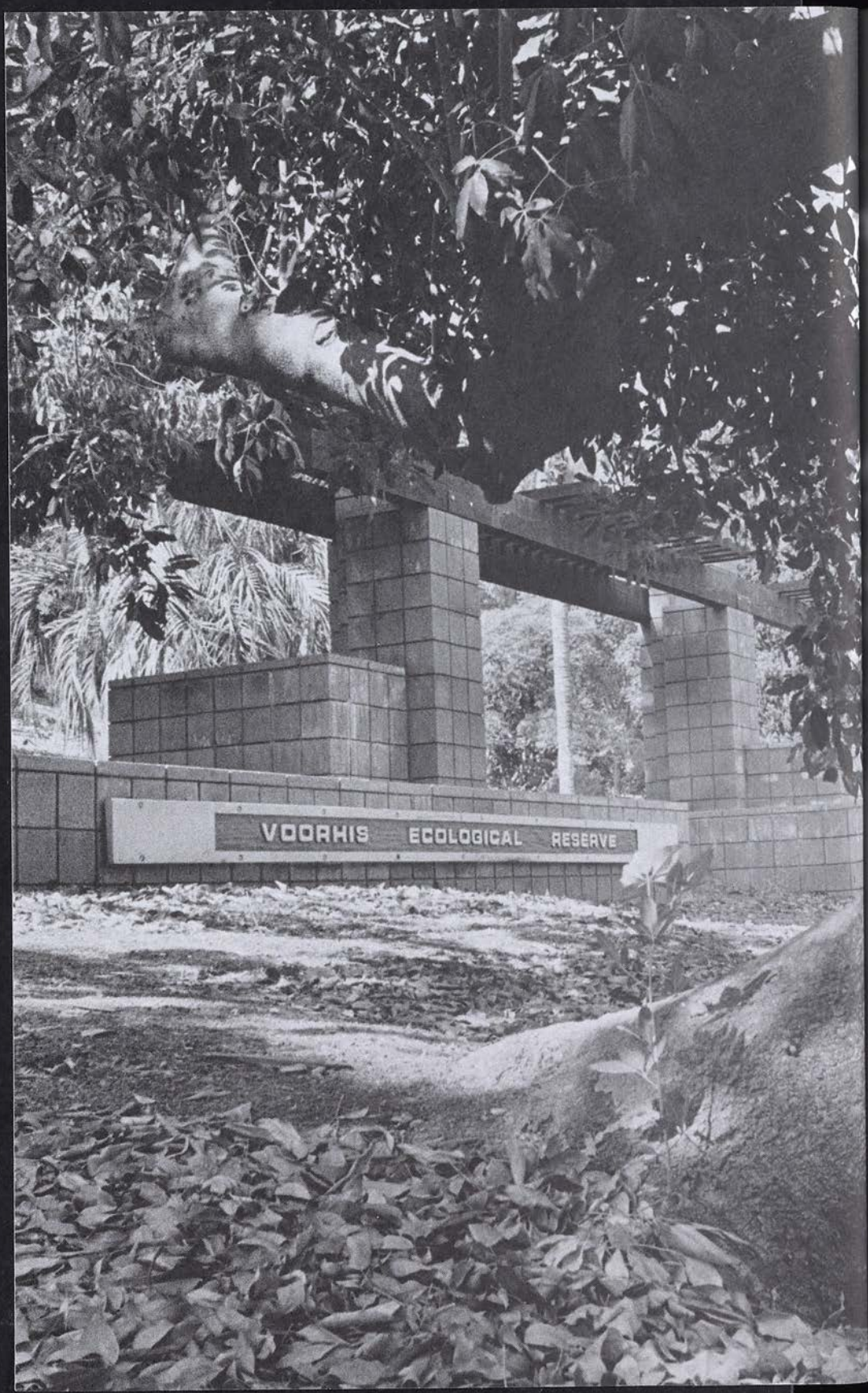
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VOORHIS ECOLOGICAL RESERVE

ACADEMIC CALENDAR—1990–91 *

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

SUMMER QUARTER, 1990

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–August 30..... Final examinations

September 3..... Labor Day—Academic Holiday

September 4 ..... Last day to submit approved Master's Thesis/Project for binding; grades due

Scheduling and Registration

June 22 ..... Last day to drop classes without courses being recorded

June 27 ..... Last day to add classes or register late

July 2 ..... Last day to withdraw and receive refund of Student Services and State University fees

July 9 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons

July 13 ..... Last day to apply for current quarter graduation

July 9-20..... Continuing students schedule classes for fall quarter

August 3 ..... Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control

FALL QUARTER, 1990

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 10 ..... Beginning of academic year and fall quarter for faculty

September 13 ..... Classes begin for all students

November 12 ..... Veteran's Day—Academic Holiday

November 22-23..... Thanksgiving—Academic Holiday

November 26-30..... Final examinations

December 5-31..... Christmas break

December 4 ..... Last day to submit approved Master's Thesis/Project for binding; grades due

JUNE

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JULY

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29	30	31				

AUGUST

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SEPTEMBER

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OCTOBER

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21	22	23	24	25	26	27
28	29	30	31			

Scheduling and Registration

September 12 ..... Supplemental registration
June 25–July 19 ..... Orientation of new students
September 19 ..... Last day to drop classes without courses being recorded
September 24 ..... Last day to add classes or register late
September 27 ..... Last day to withdraw and receive refund of student services and State University fees
October 3 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons
October 12 ..... Last day to apply for current quarter graduation
October 30 ..... Withdrawal from classes after this date permitted only by petition and only in emergency clearly beyond student's control
October 24–November 1 ..... Continuing students schedule classes for winter quarter

NOVEMBER

S	M	T	W	T	F	S
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DECEMBER

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23/30	24/31	25	26	27	28	29

WINTER QUARTER, 1991

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 2 ..... Classes begin for all students
January 21 ..... Martin Luther King's Birthday—Academic Holiday
March 11–15 ..... Final examinations
March 19 ..... Last day to submit approved Master's Thesis/Project for binding; grades due

JANUARY

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27	28	29	30	31		

Scheduling and Registration

November 5, 6 ..... Orientation of new students
January 8 ..... Last day to drop classes without courses being recorded
January 11 ..... Last day to add classes or register late
January 16 ..... Last day to withdraw and receive refund of student services and State University fees
January 23 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons
January 25 ..... Last day to apply for current quarter graduation
January 31–February 11 ..... Continuing students schedule classes for spring quarter
February 15 ..... 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
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MARCH

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SPRING QUARTER, 1991

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 25 ..... Classes begin for all students
May 27 ..... Memorial Day—Academic Holiday
June 3–7 ..... Final examinations
June 5 ..... Last day to submit approved Master's Thesis/Project for binding
June 5 ..... Grades due for graduating seniors
June 8 ..... Commencement
June 11 ..... Grades due

Scheduling and Registration

February 12, 13 ..... Orientation of new students
March 29 ..... Last day to drop classes without courses being recorded
April 3 ..... Last day to add classes or register late
April 8 ..... Last day to withdraw and receive refund of student services and State University fees
April 12 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons
April 12 ..... 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 18–29 ..... Continuing students schedule classes for Summer Quarter
May 7–20 ..... Continuing students schedule classes for Fall Quarter

SUMMER QUARTER, 1991

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 17 ..... Beginning of university year. Classes begin for all students
July 4 ..... Independence Day—Academic Holiday
August 26–29 ..... Final examinations
September 2 ..... Labor Day—Academic Holiday
September 3 ..... Last day to submit approved Master's Thesis/Project for binding; grades due

Scheduling and Registration

May 1 ..... Orientation of new students
June 21 ..... Last day to drop classes without courses being recorded
June 26 ..... Last day to add classes or register late

APRIL

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JULY

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AUGUST

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SEPTEMBER

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OCTOBER

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July 1 ..... Last day to withdraw and receive refund of student services and State University fees

July 5 ..... Withdrawal after this date permitted only by petition and for serious and compelling reasons

July 12 ..... Last day to apply for current quarter graduation

July 9–22 ..... Continuing students schedule classes for fall quarter

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

Please Note: This is not to be construed as an employee work calendar.

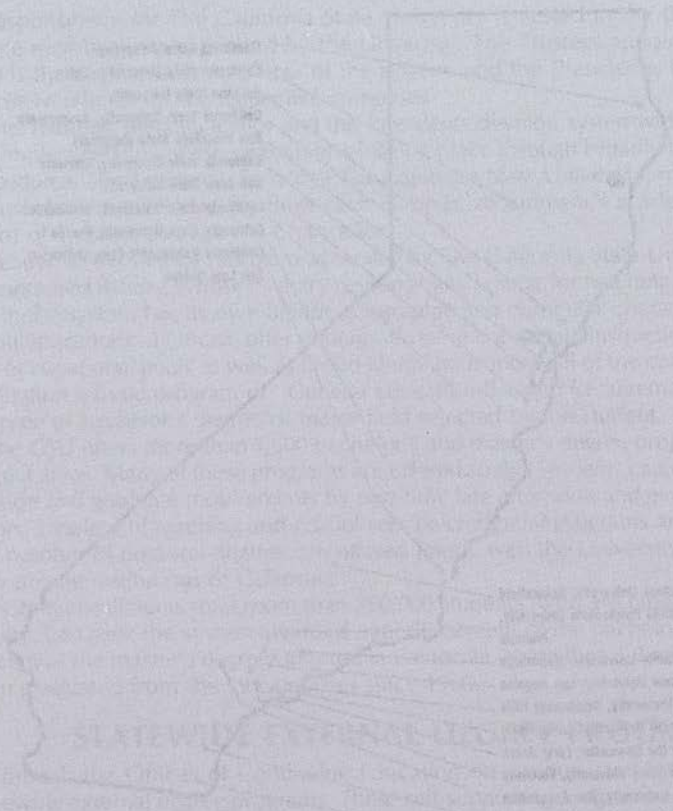
NOVEMBER

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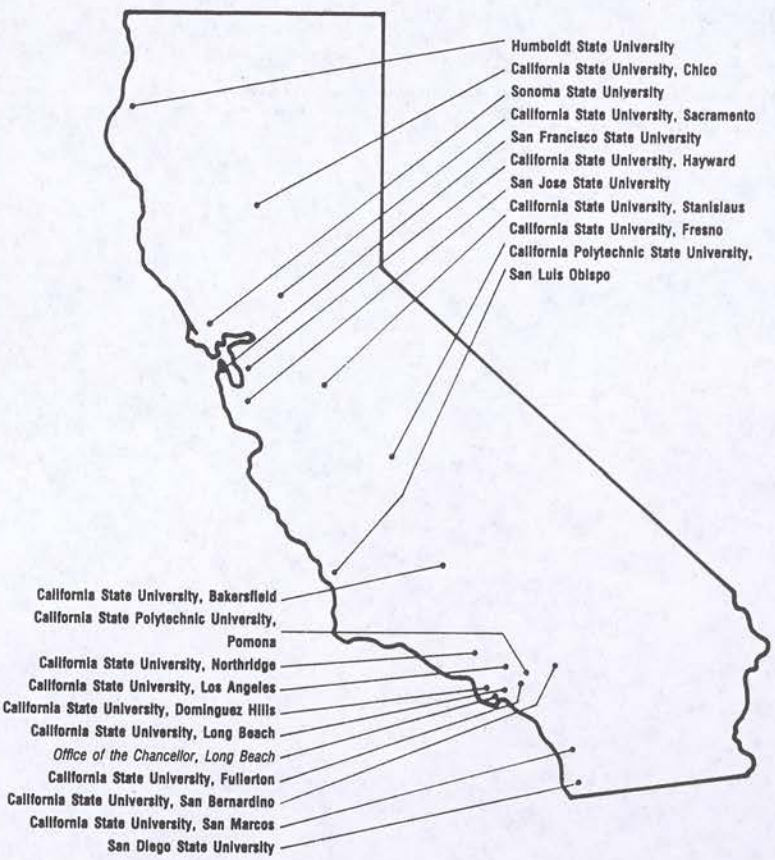
DECEMBER

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29	30	31				

* Note: Some academic calendar dates may be subject to change subsequent to publication of the catalog. For the purpose 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, all 20 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 University, San Marcos—will begin admitting students in fall 1990.

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. Many 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.

System enrollments total more than 360,000 students, who are taught by some 20,500 faculty. 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 1.2 million persons have been graduated from the 19 campuses since 1960.

STATEWIDE EXTERNAL DEGREE PROGRAMS

Through the Offices of Continuing Education on various campuses, the CSU offers Statewide external degree programs. These self-supporting programs are designed for the working adult. The coursework is offered at both on campus and off campus locations throughout the state.

These programs are entirely upper division or graduate level. Credit and coursework are transferable statewide. The programs are financed by student fees.

The following external degree programs are available in the Pomona area:

Master of Public Administration

Mr. George P. Hart, Regional Program Director
Department of Political Science
California State Polytechnic University, Pomona
3801 West Temple Avenue
Pomona, CA 91768
(714) 869-3879

M. S. Health Care Administration
Dr. Robert Tumelty, Regional Program Director
Department of Health Care Administration
California State University, Long Beach
1250 Bellflower Blvd.
Long Beach, CA 90840
(213) 498-5304

B. S. Nursing
M. S. Nursing
Ms. Kathleen Johnson, R.N., M.S.N., Regional Program Director
Statewide Nursing Program
California State University, Dominguez Hills
Carson, CA 90747
(213) 516-4060

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 Capitol Sacramento 95814
The Honorable 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 90802-4275

OFFICERS OF THE TRUSTEES

Governor George Deukmejian
President

Mr. William D. Campbell
Vice-Chair

Mrs. Marianthi Lansdale
Chairman

Chancellor W. Ann Reynolds
Secretary-Treasurer

APPOINTED TRUSTEES

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

Dr. Claudia H. Hampton (1994)
Mr. Willie J. Stennis (1991)
Mr. Lee A. Grissom (1990)
Ms. Marian Bagdasarian (1996)
Mr. Roland E. Arnall (1990)
Mrs. Marianthi Lansdale (1993)
Mr. Dean S. Lesher (1993)
Dr. John E. Kashiwabara, M.D. (1994)
Ms. Martha C. Fallgatter (1995)
Mr. William D. Campbell (1995)
Dr. Lyman H. Heine (1991)
Mr. Ralph R. Pesqueira (1996)
Mrs. Gloria S. Hom (1992)
Mr. Ted J. Saenger (1997)
Mr. Gary Shansby (1992)
Mr. Scott Vick (1991)
Mr. Anthony M. Vitti (1997)
Mr. James H. Gray (1998)

Correspondence with Trustees should be sent:

c/o Trustees Secretariat
The California State University
400 Golden Shore, Suite 322
Long Beach, California 90802-4275

OFFICE OF THE CHANCELLOR

The California State University
400 Golden Shore
Long Beach, California 90802-4275
(213) 590-5506

Dr. W. Ann Reynolds	*Chancellor*
Dr. Herbert L. Carter	*Executive Vice Chancellor*
Dr. Lee R. Kerschner	*Vice Chancellor, Academic Affairs*
Mr. D. Dale Hanner	*Vice Chancellor, Business Affairs*
Dr. Caesar J. Naples	*Vice Chancellor, Faculty and Staff Relations*
Mr. Mayer Chapman	*Vice Chancellor and General Counsel*
Dr. John M. Smart	*Vice Chancellor, University Affairs*

CAMPUSES—THE CALIFORNIA STATE UNIVERSITY

California State University, Bakersfield

9001 Stockdale Highway
Bakersfield, California 93311-1099
Dr. Tomas A. Arciniega, President
(805) 664-2011

California State University, Chico

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

California State University, Dominguez Hills

1000 East Victoria Street
Carson, California 90747
Dr. Robert C. Detweiler, President
(213) 516-3300

California State University, Fresno

5241 North Maple Avenue
Fresno, California 93740
Dr. Harold H. Haak, President
(209) 294-4240

California State University, Fullerton

800 North State College Blvd.
Fullerton, California 92634
Dr. Jewel Plummer Cobb, President
(714) 773-2011

California State University, Hayward

Hayward, California 94542
Dr. Norma S. Rees, 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. Curtis L. McCray, President
(213) 985-4111

California State University, Los Angeles

5151 State University Drive
Los Angeles, California 90032
Dr. James M. Rosser, President
(213) 343-3000

California State University, Northridge

18111 Nordhoff Street
Northridge, California 91330
Dr. James W. Cleary, President
(818) 885-1200

California State Polytechnic University, Pomona

3801 West Temple Avenue
Pomona, California 91768
Dr. Hugh O. La Bounty, President
(714) 869-7659

California State University, Sacramento

6000 J Street
Sacramento, California 95819
Dr. Donald R. Gerth, President
(916) 278-6011

California State University, San Bernardino

5500 University Parkway
San Bernardino, California 92407
Dr. Anthony H. Evans, President
(714) 880-5000

San Diego State University

5300 Campanile Drive
San Diego, California 92182
Dr. Thomas B. Day, President
(619) 594-5200
Imperial Valley Campus
720 Heber Avenue
Calexico, California 92231
(619) 357-3721

San Francisco State University

1600 Holloway Avenue
San Francisco, California 94132
Dr. Robert A. Corrigan, President
(415) 338-1111

San Jose State University

One Washington Square
San Jose, California 95192
Dr. Gail Fullerton, President
(408) 924-1000

California Polytechnic State University, San Luis Obispo

San Luis Obispo, California 93407
Dr. Warren J. Baker, President
(805) 756-1111

California State University, San Marcos

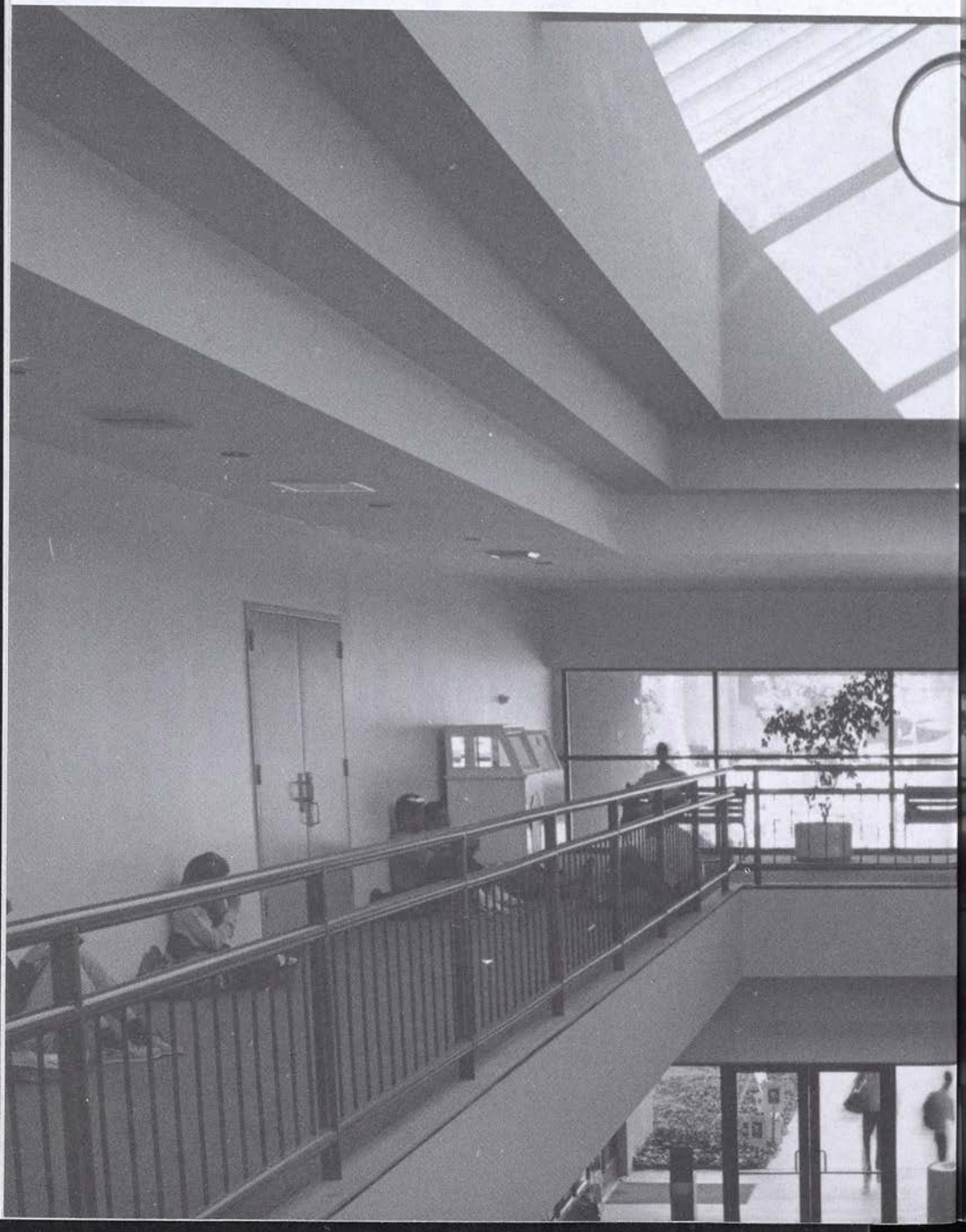
820 West Los Vallecitos Boulevard
San Marcos, California 92069
Dr. Bill W. Stacy, President
(619) 471-4119

Sonoma State University

1801 East Cotati Avenue
Rohnert Park, California 94928
Dr. David W. Benson, President
(707) 664-2880

California State University, Stanislaus

801 West Monte Vista Avenue
Turlock, California 95380
Dr. John W. Moore, President
(209) 667-3122



GENERAL ADMINISTRATION



CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

UNIVERSITY ADMINISTRATION

Hugh O. La Bounty, *President*

Bruce F. Grube, *Provost and Academic Vice President*

Thomas B. Robinson, *Vice President for Student Affairs*

Ruben Arminana, *Vice President for Finance and Development*

Thomas Simms, *Acting Executive Director of Business Operations*

MISSION STATEMENT

The primary mission of California State Polytechnic University, Pomona is to provide instruction for students in the undergraduate and graduate programs (through the Master's) in the liberal arts and sciences, in applied fields and in the professions.

California State Polytechnic University, Pomona is committed to enrolling and educating a student population that reflects the rich diversity of the region it serves. The university 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 in its 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 support the concept of voluntary community service as an important element in the development of an educated student.
7. To foster international education through its curricula, its students, and through cooperation with national and international governmental agencies as well as with private agencies and institutions.
8. To strengthen a tradition for joint enterprise among students, faculty, administration, and staff in promoting excellence and in developing university programs and policies.
9. 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 40051 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 19,000 men and women. The number of degrees granted increased from 54 in June 1957 to over 3,000 in 1987.

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 the following areas: Agriculture Specialist Credential, Adaptive Physical Education Credential, Bilingual/Cross Cultural Specialist Credential, Designated Subjects Credential, Business and Marketing Education, Multiple Subject Teaching Credential, Single Subject Teaching Credential, Reading Specialist Teaching Credential, Special Education Specialist Credentials, including Learning Handicapped, Severely Handicapped, and Resource Specialist Certificate.

The College 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 baccalaureate program in agricultural engineering is also accredited by ABET. This program is housed in the College of Agriculture.

The Park Administration program in the College of Agriculture is accredited by the American Association for Leisure and Recreation.

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

The College of Environmental Design is accredited by the American Society of Landscape Architects for its programs in landscape architecture and recognized by the American Planning Association (Planning Accreditation Board) for its program in urban planning. The Bachelor and Master of Architecture degrees are accredited by the National Architectural Accrediting Board.

The College 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 (Interstate 10) on the eastern slope of Kellogg Hill, the campus is the second largest in acreage 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, environmental design, 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 on University Drive 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 communication, economics, science, and student publications laboratories.

* Numbers in parentheses indicate building locations on campus map.

LIBRARY

The centrally located University Library (15) is housed in a six-story building with floor space of 204,880 square feet and reader stations for 2,500 students. The collections exceed 2.2 million items; included are 535,225 volumes, 1,607,306 microforms, 3,402 software packages, 10,436 maps, and 58,500 technical reports. The Library also houses the W. K. Kellogg Arabian Horse Collection, which consists mainly of current and out-of-print books and periodicals dealing with the Arabian Horse. The Library subscribes to 3,500 periodicals and 54 newspapers. The Library's special facilities and service include computer-assisted search services, group study rooms, typewriters, lockers, photo-, micro-, and cassette-tape copiers, facilities for disabled students, a 24-hour computer lab, a 24-hour study lab, Learning Resource Center, and information guides. Specialized workshops are periodically offered to students and faculty, and a self-paced Library workbook is available for purchase. Personal assistance in using the Library's resources is available at four service desks and by appointment with Reference staff. Through reciprocal lending agreements and interlibrary loan services, students may acquire materials from other libraries. The Library is open 89 hours a week, Monday–Sunday. For further information, call (714) 869-3074.

AGRICULTURAL FACILITIES

The chief agricultural facility is the agriculture building (2) which contains laboratories, classrooms, faculty offices, and the college offices. Additional laboratories and offices are located in the College of Environmental Design (7), in the College of Arts (5), and in the University Office Building (94).

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, the Raymond Burr orchid collection

and The Oliver A. "Jolly" Batcheller Conservatory.

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 (67) forms part of this complex.

Campus acreage utilized by the College 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 College 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 College of Arts are found in many areas of the campus. The college offices along with the departments of behavioral science, social sciences, and Liberal Studies are located in the College of Arts Building (5). Other college departments are located in the University Office Building (94): Ethnic and Womens Studies, History, Political Science, and Social Work. Besides general classrooms and faculty offices, the building also houses the Instructional Technology Center, broadcast laboratories, Social Data Instructional Center, and the School of Education.

Communication and student publication offices are located on the third floor of the Administration Building (1). The Economics Department is located in the Engineering Building (9). Facilities for teaching art classes are located in the Aerospace, Chemical, and Industrial Engineering Building (12). The forensics program, Learning Resource Center, and related faculty offices are in the Library Building (15).

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 a 180-seat recital hall, choral and orchestra rooms, faculty offices for English, music, and foreign languages, individual practice rooms, and a music library. The dance studio is located in the physical education facility.

The Physical Education Facility (41-44) houses the Health, Physical Education, and Recreation Department office and 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, a softball field, and a football field.

BUSINESS ADMINISTRATION FACILITIES

College of Business Administration operations are centered in the two-story Business Building (6) on the central quadrangle. This structure contains classrooms, computing laboratories, faculty offices and the college offices. Some instructional facilities and faculty offices for the college are located in the Engineering Center (9), the Bronco Book-Store Building (66), and in Building 85. Additional faculty offices are located in the University Office Building (94) and the Campus Center (97).

JAMES AND CAROL COLLINS CENTER FOR HOSPITALITY MANAGEMENT

The Center for Hospitality Management (79) is located atop a hill adjacent to the Kellogg West Center for Continuing Education and overlooks the Diamond Bar, Walnut, and Pomona valleys. Completed in November 1989, the 14,000 square foot facility houses a production kitchen and dining room with a 125 person seating capacity, a demonstration auditorium, a computer laboratory, a kitchen laboratory and research facility, a hotel laboratory, and faculty offices. The building was constructed through a major fund-raising

effort which included leaders in the restaurant and hotel services industry. State-of-the-art kitchens provide a hands-on environment for students developing food service management techniques. Some instructional and faculty offices for the Center are located in building 85.

COMPUTING FACILITIES

Computing resources are provided to students and faculty for educational purposes. The general purpose computer resources under the responsibility of the Computer Center consist of a Digital VAX 6330 and 8530 (clustered together), an AT&T 3B15, a Prime 9755, and IBM 3081 (located at another CSU campus) and a Cyber 960 and ELXI 6400 located at the CSU's Central Computing Facility in Seal Beach.

All of these resources can be accessed from terminals or micros either on campus or off-campus. On-campus computer access can be accomplished from any of sixteen Computer Center Labs which are open 24 hours a day, seven days a week. The computing labs have terminals, Apple micros, IBM and AT&T PC's, with various peripheral devices, including graphics, disk drives and printers. Two additional labs are for the exclusive use of faculty. Off-campus access can be achieved through the use of a modem.

Several specialty labs have been established by the colleges to allow students "hands on" experience within particular educational areas. These labs contain various types of computing equipment and software which are specifically designed for a particular discipline.

ENGINEERING FACILITIES

The College of Engineering facilities consist of seven buildings. A five-story Engineering Center (9) houses the college'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 College of Engineering facilities and their operation emphasizes the college'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, print room, and classrooms for architecture, landscape architecture and urban and regional planning, as well as faculty offices and the college offices. Additional studios, classrooms, a shop, and photo laboratory, are located in the adjacent College of Agriculture Building (2). Graduate studies are also housed in building 71.

INSTRUCTIONAL TECHNOLOGY CENTER (ITC)

The ITC provides full-service faculty media support. Its primary mission is to provide instructional material design and development and media support for the improvement of instructional quality in university classrooms and off-campus sites. The graphic and photographic resources of the ITC include: commercial-quality art production; studio and location photographic capabilities in all formats; professional sound services ; and desk-top publishing services. Television resources include centralized closed-circuit distribution of video programming; a broadcast-quality production studio; a fully-equipped student laboratory studio; and interactive instructional delivery to remote classroom sites via narrow band microwave, satellite and other distance learning technologies. Other services include: research on availability and purchase/rental of media; scheduling and delivery of media and playback equipment to the classroom; and custom development of specialized media presentation environments.

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. The College of Science's administrative offices and the University Computer Center are also housed in the addition.

UNIVERSITY UNION and UNION PLAZA

The University Union was constructed in 1974 and its first addition, the Union Plaza was renovated in 1980. They provide recreational, programming and service facilities and serve the campus community as the center for out-of-classroom education. The Union hosts over 2,400 scheduled activities each year and serves as a service center, meeting the needs of both organizations and individuals.

The University Union houses the Information Desk/Candy Corral and campus Lost and Found, Kinko's Copy Center, Pastimes (leisure activies center), the Sound Stage (a full service cafeteria), Take Five (serving beer and munchies), the Ice Cream Shoppe, a full service vending area, Bank of America and Security Pacific Bank Automated Teller Machines, the Games Room (offering a variety of games as well as television and music listening lounges), Ticket Services (which sells tickets to ASI Programming events, theatres, concerts, and discount movie tickets), the ASI/UU Gallery, and the Cal Poly Federal Credit Union.

The Union Plaza houses the offices for the Associated Students, Inc., the University Union Board, the office of Student Life, Latter Day Saints Student Association, Poly Vue, Rose Float, Interfaith Center, Pi Sigma Epsilon's Booknook, and Campus Trends hair salon.

The goals of the University Union and its facilities are to provide for the cultural, recreational and social needs of the campus community. Through its professional and support staff, it is committed to providing significant growth opportunities to students in both volunteer leadership positions and employment. The Union is committed to the principles of student development through active involvement in the learning process.

Both the University Union and Union Plaza are accessible to the handicapped.

THE DUPLEX

The Duplex (95) is located directly across from the student cafeteria and houses the Office of Student Outreach and Recruitment, Student Affirmative Action, the Center for Re-Entry and Transition, and the University Advising Center.

UNIVERSITY OFFICE BUILDING (94)

This office complex houses faculty and departmental offices from the Colleges of Agriculture, Arts, and Business Administration. The Educational Opportunity Program is also located in this facility.

STUDENT RESIDENCE AREA

Six residence halls (20, 21, 22, 23, 57, 58) accommodating 1184 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. University Village located on Temple Avenue also accommodates 400 students in 12 two-story buildings with eight apartment units in each, and a single story building of four units, set in a satellite pattern around a central quad on 8.3 landscaped acres.

STUDENT HEALTH AND PSYCHOLOGICAL SERVICES

Student Health and Psychological Services (46) provides ambulatory student care by qualified physicians, for acute and subacute conditions by appointment and on an emer-

gency basis. It is open Monday through Thursday between 8:00 a.m. and 6:00 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 psychological and health counseling. No overnight infirmary care is available, but daytime bed rest facilities are provided. Most of the services are cost-free; there may be 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) houses 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.

KELLOGG WEST

The Kellogg West Center for 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 CSU 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) 869-2250.

Continuing Education

Cal Poly recognizes an important community need by providing access to higher education beyond the typical established patterns of regular on-campus instruction and full-time student enrollment. Through the Office of Continuing Education, assistance is given to organizations and individuals who seek to improve and update their career goals and 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, external degrees, certificate programs, workshops, conferences, institutes, and on-site corporate and organizational training, 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.

To receive a Continuing Education Bulletin of programs or further information on other educational opportunities, contact the Office of Continuing Education at (714) 869-2288.

Cal Poly Kellogg Unit Foundation, Inc.

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 College 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, seven vice presidents representing the instructional colleges of the university, one vice president representing the instructional centers of the university and alumni charter 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. Its primary purpose is to enhance the image of and provide service to the university and its alumni.

In addition to maintaining contact with graduates, the association sponsors a senior portrait program, is responsible for alumni publications, annually honors a distinguished alumnus from each college and center, presents the annual fund raising Benefit Dinner and Auction, co-sponsors a career fair, holds seminars for alumni, and promotes travel, merchandise, and other select opportunities for alumni. Other service activities include representing the alumni on several universitywide committees, the Voorhis Alumni Association scholarship, and the emergency Alumni-Student Loan Fund.

Information about the association may be obtained by writing the Alumni Affairs Office c/o the University or by calling (714) 869-2963.

GENERAL INFORMATION



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 Code of Regulations.* 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 (CSU) or at any California high school or community college.

Importance of Filing Complete, Accurate, and Authentic Application for Admission Documents

The CSU advises prospective students that they must supply complete and accurate information on the application for admission, residence questionnaire, and financial aid forms. Further, applicants must submit authentic and official transcripts of all previous academic work attempted. Failure to file complete, accurate, and authentic application documents may result in denial of admission, cancellation of academic credit, suspension, or expulsion (Section 41301, Article 1.1, Title 5, *California Code of Regulations).*

Health Screening

All new and readmitted students, born after January 1, 1957, will be notified of the requirement to present proof of measles and rubella immunizations. This is *not* an admissions requirement, but shall be required of students by the beginning of their second term of enrollment in CSU. Proof of measles and rubella immunizations shall also be required for certain groups of enrolled students who have increased exposure to these diseases.

Certain students, born after January 1, 1957, are required to present proof to the Student Health Services of live measles and rubella immunizations by the beginning of the next term of enrollment. Those who have not presented acceptable proof of the immunizations at this time will not receive registration materials to enroll for the succeeding term until they comply. Persons subject to these health screening provisions include:

New students enrolling fall 1986 or later;

Readmitted students reenrolling fall 1986 and later;

Students who reside in campus residence halls;

Students who obtained their primary and secondary schooling outside the United States;

Students enrolled in dietetics, medical technology, physical therapy, and any practicum, student teaching, or field work involving preschool-age children, school-age children or taking place in a hospital or health care setting.

The Student Health Center shall provide immunizations without cost to those students unable to obtain acceptable proof of immunizations.

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 Admissions booklet. The $55 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 major will be considered at the first choice campus before an application is redirected to an alternative choice campus. Applicants will be con-

sidered automatically at the alternative choice campus if the first choice campus cannot accommodate them.

GRADUATE AND POSTBACCALAUREATE APPLICATION PROCEDURES

All graduate and postbaccalaureate applicants (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 as described in the admissions booklet. Applicants who completed undergraduate degree requirements and graduated the preceding term are also required to complete and submit an application and the $55 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. To be assured of initial consideration by more than one campus, it will be necessary for any applicant 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.

SPACE RESERVATION NOTICES

Normally, you may expect to receive some form of space reservation notice from your 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 your previous academic record indicates that admission requirements have been met. Such a notice is not transferable to another term or to another campus.

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 university where openings are available. No additional application fee is required.

IMPACTED PROGRAMS

The CSU designates programs to be impacted when more applications are received in the first month of the filing period than the spaces available. Some programs are impacted at every campus where they are offered; others are impacted at some campuses but not all. You must meet supplementary admissions criteria if applying to an impacted program.

The CSU will announce before the opening of the fall filing period which programs are impacted and the supplementary criteria campuses will use. That announcement will be published in the *CSU School and College Review,* distributed to high school and college counselors. Information about the supplementary criteria will also be provided to program applicants.

You must file your application for admission to an impacted program during the first month of the filing period. Further, if you wish to be considered in impacted programs at two or more campuses, you must file an application to each. Nonresident applicants are rarely admitted to impacted programs.

Supplementary Admission Criteria

Each campus with impacted programs uses supplementary admission criteria in screening applicants. Supplementary criteria may include ranking on the freshman eligibility index, the overall transfer grade point average, and a combination of campus-developed criteria. If you are required to submit scores on either the SAT or the ACT, you should take the test no later than December if applying for fall admission.

The supplementary admission criteria used by the individual campuses to screen applicants appear periodically in the *CSU School and College Review* 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.

UNDECLARED MAJOR

A first-time freshman may be allowed the option of either declaring a major upon application to the university, or of entering the university without a major. First-time freshmen who do not choose to declare a major at the time of application, *must* declare a regular academic major by the end of the third quarter in attendance at the university. All undeclared major students are advised to take a course in Career and Personal Exploration (CPU 100, 3 units). Students who do not, or are not able to declare a regular major within the three quarter time period may be advised to transfer to a community college until they are able to declare a major. In some cases, students may be administratively withdrawn from the university. Individuals who transfer to the university must declare a major upon application to the university. The central office for non-EOP undeclared majors is in University Advising Center #2, Building 95, (714) 869-3254.

NONDISCRIMINATION POLICY

California State Polytechnic University, Pomona, is committed to being a community in which individual differences enrich the whole. In this University community, diversity is valued and respected, and all members live and work free from harassment, abuse, mockery, or discrimination. Acts of racism and discrimination of any type shall not be tolerated by the University.

Cal Poly Pomona reaffirms its long-standing commitment to foster an educational and work environment that is free from all forms of discrimination and harassment. The University unequivocally condemns acts that single out any individual or group for hostile or derogatory treatment. Persons who engage in such behavior can expect disciplinary action that can result in expulsion from the University community.

As a university, we cannot tolerate discriminatory acts because they are inconsistent with the collegial and inquiring spirit inherent in our mission. Cal Poly, like other communities, is bound by a sense of belonging, and we must continue to cultivate and nourish this sense of belonging in both our words and actions.

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) 869-2046, the campus officer assigned the administrative responsibility of reviewing such matters or to the Regional Director of the Office of Civil Rights, Region 9, 221 Main Street, 10th Floor, San Francisco, CA 94105.

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 at University Library Room 110, (714) 869-3268.

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

The campus has established procedures for consideration of qualified applicants who would be faced with extreme hardship if not admitted. Petitioners should write the Admissions Office regarding specific policies governing hardship admission.

APPLICATION FILING PERIODS FOR 1990–91

Terms in 1990–91	*Applications First Accepted*	*Filing Period Duration*	*Student Notification Begins*
Summer Qtr. 1990	Feb. 1, 1990	Each campus accepts applications until capacities are reached. Many campuses limit undergraduate admissions in any enrollment category because of overall enrollment limits. If applying after the initial filing period, consult the campus admissions office for current information.	March 1990
Fall Sem. or Qtr. 1990	Nov. 1, 1989		Dec. 1989
Winter Qtr. 1991	June 1, 1990		July 1990
Spring Sem. or Qtr. 1991	Aug. 1, 1990		Sept. 1990

Application Acknowledgment

You may expect to receive an acknowledgment of your application from your first choice campus within two to four weeks of filing the application. A notice that space has been reserved for you will also include a request that you submit the records necessary for the campus to evaluate your qualifications. You may be assured of admission if the evaluation of your qualifications indicates that you meet admission requirements. Such a notice is not transferable to another term or to another campus.

Undergraduate Admission Requirements

First-Time Freshman Applicants

You will qualify for regular admission as a first-time freshman if you

1. are a high school graduate,
2. have a qualifiable eligibility index (see page 33), and
3. have completed with grades of C or better the courses in the comprehensive pattern of college preparatory subject requirements (see "Subject Requirements" and "Phase-in of the Subject Requirements"). Courses must be completed prior to the first enrollment in The California State University.

Subject Requirements—The California State University requires that first-time freshman applicants complete, with grades of C or better, a comprehensive pattern of college preparatory study totaling 15 units. A "unit" is one year of study in high school.

English, 4 years.
Mathematics, 3 years: algebra, geometry, and intermedite alegebra.
U.S. history or U.S. history and government, 1 year.
Science, 1 year with laboratory: biology, chemistry, physics, or other acceptable laboratory science.
Foreign language, 2 years in the same language (subject to waiver for applicants demonstrating equivalent competence).
Visual and performing arts, 1 year: art, dance, drama/theater, or music.
Electives, 3 years: selected from English, advanced mathematics, social science, history, laboratory science, foreign language, visual and performing arts, and agriculture.

Phase-in and Waiver of Foreign Language

Phase-in of the Subject Requirements— CSU is phasing in the freshman subject requirements and during the phase-in period will admit, on condition, applicants who meet all other admission requirements but are missing a limited number of the required subjects. Students admitted on condition must make up missing subjects after enrolling in the CSU.

The phase-in schedule is:

Fall 1990–Summer 1992: at least 12 of the required 15 units, including at least 3 of the units required in English and 2 of the units required in mathematics..

Fall 1992–Summer 1993: at least 13 of the required 15 units, including at least 3 of the units required in English and 2 of the units required in mathematics.

Fall 1993 and later: full implementation of the 15-unit requirement expected.

Waiver of Foreign Language Subject Requirement— The foreign language subject requirement may be waived for applicants who demonstrate competence in a language other than English equivalent to or higher than expected of students who complete two years of foreign language study. Consult with your school counselor or any CSU campus admissions or schools relations office for further information.

Subject Requirement Substitution for Students with Disabilities—Disabled student applicants are strongly encouraged to complete college preparatory course requirements if at all possible. If an applicant is judged unable to fulfill a specific course requirement because of his or her disability, alternative college preparatory courses may be substituted for specific subject requirements. Students who are deaf and hearing impaired, have learning disabilities, or are blind and visually impaired, may in certain circumstances qualify for substitutions for the foreign language, laboratory science and mathematics subject requirements. Substitutions may be authorized on an individual basis after review and recommendation by the applicant's academic adviser or guidance counselor in consultation with the director of a CSU disabled student services program. Although the distribution may be slightly different from the course pattern required of other students, students qualifying for substitutions will still be held for 15 units of college preparatory study. Students should be aware that course substitutions may limit later enrollment in certain majors, particularly those involving mathematics. For further information and substitution forms, please call the director of disabled student services at your nearest CSU campus.

Honors Courses

Grades in up to eight semester courses designated as honors courses in approved subjects and taken in the last two years of high school receive additional points in grade point average calculations. Each unit of A in approved courses will receive a total of 5 points; B, 4 points; C, 3 points; D, 1 point; and none for F grades.

Test Requirements

Freshman and transfer applicants who have fewer than 56 semester or 84 quarter units of transferable college work must submit scores from either the Scholastic Aptitude Test

of the College Board (SAT) or the American College Test Program (ACT). At San Luis Obispo, test scores are required of all transfer applicants. You may get registration forms and the dates for either test from school or college counselors or from a campus Testing Office. Or, you may write to:

The College Board (SAT)
Registration Unit, Box 592
Princeton, NJ 08541

American College Testing Program (ACT)
Registration Unit, P.O. Box 168
Iowa City, IA 52240

TOEFL Requirement

All undergraduate applicants, regardless of citizenship, who have not attended schools at the secondary level or above for at least 3 years full time where English is the principal language of instruction must present a score of 500 or above on the Test of English as a Foreign Language (TOEFL). Campuses may require a score higher than 500. At California State Polytechnic University Pomona the minimum undergraduate score is 525, and the exam must include the essay part.

Systemwide Tests Required of Most New Students

The CSU requires new students to be tested in English and mathematics after they are admitted. These are not admission tests, but a way to determine if you are prepared for college work and, if not, to counsel you how to strengthen your preparation. You might be exempted from one or both of the tests if you have scored well on other specified tests or completed appropriate courses.

English Placement Test (EPT)—The CSU English Placement Test must be completed by all new undergraduates with the exception of those who present proof of one of the following:

- a score of 3, 4, or 5 on either the Language and Composition or the Composition and Literature examination of the College Board Advanced Placement Program;
- a score on the CSU English Equivalency Examination that qualifies a student for exemption from the English Placement Test;
- a score of 470 or above on the Verbal section of the College Board Scholastic Aptitude Test (SAT-Verbal);
- a score of 22 or above on the ACT English Usage Test; or 25 for ACT after October, 1989;
- a score of 600 or above on the College Board Achievement Test in English Composition *with essay*; or
- for transfer students, completion and transfer to the CSU of an acceptable college course in English composition of four quarter or three semester units with a grade of C or better.

Entry Level Mathematics (ELM) Test—All new undergraduate students must take the test and *pass it* before enrolling in a course that satisfies the college level mathematics requirement of the General Education-Breadth program. Exemptions from the test are given only to those students who can present proof of one of the following:

- a score of 3 or above on the College Board Advanced Placement Mathematics examination (AB or BC);
- a score of 530 or above on the Mathematics section of the Scholastic Aptitude Test (SAT-Math);
- a score of 23 or above on the ACT Mathematics Test;
- a score of 23 or above on the ACTE (enhanced) Mathemathics Test;
- a score of 520 or above on the College Board Math Achievement Test, Level 1;
- a score of 540 or above on the College Board Math Achievement Test, Level 2; or
- for transfer students, completion and transfer to the CSU of a college course that satisfies the General Education-Breadth Requirement in Quantitative Reasoning, provided it is at the level of college algebra or above with a grade of C or better. Such

courses taken in terms prior to fall 1988 may be at the level of intermediate algebra or above.

Failure to take either of these tests, as required, at the earliest opportunity after admission may lead to administrative probation, which, according to Section 41300.1 of Title 5, *California Code of Regulations,* and CSU Executive Order 393, may lead to disqualification from future 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 on their fee bill and must register and take the next scheduled exam. Those students who still do not take these examinations will not be allowed to take courses after their second quarter of enrollment.

Information bulletins and registration materials for the EPT/ELM will be mailed to all students subject to the requirements. The materials may also be obtained from the Office of Admissions and Records. Further information regarding these examinations and possible exemptions may be obtained from the Office of Academic Testing, Bldg. 1, Room 101.

Adult Students

As an alternative to regular admission criteria, an applicant who is twenty-five years of age or older may be considered for admission as an adult student if he or she meets the following conditions:

1. Possesses a high school diploma (or has established equivalence through either the Tests of General Education Development or the California High School Proficiency Examination).
2. Has not been enrolled in college as a full-time student for more than one term during the past five years.
3. If there has been any college attendance in the past five years, has earned a C average or better.

Consideration will be based upon a judgment as to whether the applicant is as likely to succeed as a regularly admitted freshman or transfer and will include an assessment of basic skills in the English language and mathematical computation.

Grade Point Average and Test Score Requirement

Eligibility Index—The eligibility index is the combination of your high school grade point average and your score on either the American College Test (ACT) or the Scholastic Aptitude Test (SAT). Your grade point average is based on grades earned during your final three years of high school (excluding physical education and military science) and bonus points for approved honors courses (see "Honors Courses"). CSU may offer you early, provisional admission based on work completed through the junior year of high school and planned for your senior year.

You can calculate the index by multiplying your grade point average by 800 and adding your total score on the SAT. Or, if you took the ACT, multiply your grade point average by 200 and add ten times the composite score from the ACT. If you are a California high school graduate (or a resident of California for tuition purposes), you need a minimum index of 2800 using the SAT or 694 using the ACT; the Eligibility Index Table illustrates several combinations of required test scores and averages.

If you neither graduated from a California high school nor are a legal resident of California for tuition purposes, you need a minimum of 3402 (SAT) or 842 (ACT).

Applicants with grade point averages above 3.00 (3.60 for nonresidents) are exempt from the test requirement.

You will qualify for regular admission when the university verifies that you have a qualifiable eligibility index and will have completed the comprehensive pattern of college preparatory subjects and, if applying to an impacted program, meet supplementary criteria. You will still qualify for regular admission, *on condition,* if you are otherwise eligible but

are missing a limited number of the required subjects (see "Phase-in" section). "Conditional admission" is an alternative means to establish eligibility for regular admission. Please consult a counselor if you have questions.

Graduates of secondary schools in foreign counties must be judged to have academic preparation and abilities equivalent to applicants eligible under this section.

Eligibility Index Table for California High School Graduates or Residents of California

GPA	ACT Score	SAT Score	GPA	ACT Score	SAT Score	GPA	ACT Score	SAT Score
3.00 and above qualifies with any score			2.66	17	680	2.31	24	960
			2.65	17	680	2.30	24	960
2.99	10	410	2.64	17	690	2.29	24	970
2.98	10	420	2.63	17	700	2.28	24	980
2.97	10	430	2.62	17	710	2.27	24	990
2.96	11	440	2.61	18	720	2.26	25	1000
2.95	11	440	2.60	18	720	2.25	25	1000
2.94	11	450	2.59	18	730	2.24	25	1010
2.93	11	460	2.58	18	740	2.23	25	1020
2.92	11	470	2.57	18	750	2.22	25	1030
2.91	12	480	2.56	19	760	2.21	26	1040
2.90	12	480	2.55	19	760	2.20	26	1040
2.89	12	490	2.54	19	770	2.19	26	1050
2.88	12	500	2.53	19	780	2.18	26	1070
2.87	12	510	2.52	19	790	2.17	26	1070
2.86	13	520	2.51	20	800	2.16	27	1080
2.85	13	520	2.50	20	800	2.15	27	1080
2.84	13	530	2.49	20	810	2.14	27	1090
2.83	13	540	2.48	20	820	2.13	27	1100
2.82	13	550	2.47	20	830	2.12	27	1110
2.81	14	560	2.46	21	840	2.11	28	1120
2.80	14	560	2.45	21	840	210	28	1120
2.79	14	570	2.44	21	850	2.09	28	1130
2.78	14	580	2.43	21	860	2.08	28	1140
2.77	14	590	2.42	21	870	2.07	28	1150
2.76	15	600	2.41	22	880	2.06	29	1160
2.75	15	600	2.40	22	880	2.05	29	1160
2.74	15	610	2.39	22	890	2.04	29	1170
2.73	15	620	2.38	22	900	2.03	29	1180
2.72	15	630	2.37	22	910	2.02	29	1190
2.71	16	640	2.36	23	920	2.01	30	1200
2.70	16	640	2.35	23	920	2.00	30	1200
2.69	16	650	2.34	23	930			
2.68	16	660	2.33	23	940	Below 2.00 does not qualify for regular admission		
2.67	16	670	2.32	23	950			

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 ADMISSION REQUIREMENTS

Transfer Requirements

You will qualify for admission as a transfer student if you have a grade point average of 2.0 (C) or better in all transferable units attempted, are in good standing at the last college or university attended and meet any of the following standards:

1. You will meet the freshman admission requirements in effect for the term to which you are applying (see "Freshman Requirements" section).

2. a. You were eligible as a freshman at the time of high school graduation and have been in continuous attendance in an accredited college since high school graduation, or
   b. You were eligible as a freshman at the time of high school graduation except for the subject requirements, have made up the missing subjects, and have been in continuous attendance in an accredited college since high school graduation.
3. You have completed at least 56 transferable semester (84 quarter) units and have made up any missing subject requirements (see "Making Up Missing College Preparatory Subjects" section). Nonresidents must have a 2.4 grade point average or better.

For this requirement, transferable courses are those designated for that purpose by the college or university offering the courses.

Making Up Missing College Preparatory Subject Requirements—Undergraduate transfer applicants who did not complete the subject requirements while in high school may make up missing subjects in any of the following ways:

1. Complete appropriate courses with a C or better in adult school or high school summer sessions.
2. Complete appropriate college courses with a C or better.
3. Earn acceptable scores on specified examinations.
4. Applicants with 56 or more semester (84 quarter) units may complete, with a C or better in each course, one of the following alternatives:
   a. *1987 or earlier high school graduates:* the CSU general education requirements in communication in the English language (at least 9 semester units) and mathematics (usually 3 semester units);
   b. *1988 and later high school graduates:* complete a minimum of 30 semester (45 quarter) units to be chosen from courses in English, arts and humanities, social science, science, and mathematics of at least equivalent level to courses that meet general education or transfer curriculum requirements. Each student must complete all CSU general education requirements in communication in the English language (at least 9 semester units) and mathematics (usually 3 semester units) as part of the 30 unit requirement.

Please consult with any CSU admissions office for further information about alternative ways to satisfy the subject requirements.

ADMISSION OF POSTBACCALAUREATE AND GRADUATE STUDENTS

Admission Requirements

Graduate and postbaccalaureate applicants may apply for a degree objective, a credential or certificate objective, or may have no program objective. Depending on the objective, the CSU will consider an application for admission in one of four categories:

- *Postbaccalaureate Unclassified*—You will qualify for admission as an unclassified postbaccalaureate student if you (1) hold an acceptable bachelor's degree from a regionally accredited institution or have equivalent preparation as determined by the campus; (2) have a grade point average of at least 2.50 in your last 60 semester (90 quarter) units; and (3) are in good standing at the last college you attended. In unusual circumstances, a campus may make exceptions to these criteria.

If eligible in postbaccalaureate unclassified standing, you may qualify for:

- *Postbaccalaureate Classified* standing to enroll in a credential or certificate program provided you satisfy the additional professional, personal, scholastic, and other standards, including qualifying examinations, as the campus may prescribe; or
- *Graduate Conditionally Classified* standing to enroll in a graduate degree curriculum if in the opinion of appropriate campus authority you can remedy any deficiencies by additional preparation; or

- *Graduate Classified* standing to enroll in a graduate degree curriculum if you satisfactorily meet the professional, personal, scholastic, and other standards, including qualifying examinations, and the GWT, as the campus may prescribe.

TOEFL Requirement

All graduate and postbaccalaureate applicants, regardless of citizenship, whose preparatory education was principally in a language other than English must demonstrate competence in English. Those who do not possess a bachelor's degree from a postsecondary institution where English is the principal language of instruction must receive a minimum score of 550 on the Test of English as a Foreign Language (TOEFL) including the essay part. Some campuses require a higher score.

International (Foreign) Students

UNDERGRADUATE VISA STUDENTS

The CSU must assess the academic preparation of foreign students. For this purpose, "foreign students" include those who hold U.S. visas as students, exchange visitors, or in other nonimmigrant classifications.

The CSU uses separate requirements and application filing dates in the admission of foreign students. Verification of your English proficiency (see the section on TOEFL Requirement for undergraduate applicants), financial resources, and academic performance are all important considerations in your admission. Academic records from foreign institutions must be on file at least eight weeks before registration for the first term and, if not in English, must be accompanied by certified English translations.

Priority in admission is given to residents of California. There is little likelihood of nonresident applicants, including international students, being admitted to either impacted majors or to those with limited openings.

The university's strong curricular orientation toward performance and production well suits the academic needs of not only California but also other nations. For that reason, for decades Cal Poly has been committed to making an important contribution in the field of International Education. Qualified students from all countries are encouraged to apply for admissions and should use the following regulations as guidelines.

1. Application forms can be obtained from the Admissions Office. All documents and test scores must be submitted in a timely manner.
2. All undergraduate visa student applicants must earn a score of at least 525 on the Test of English as a Foreign Language (T.O.E.F.L.). Graduate applicants must earn a score of at least 550 and certain academic departments may require higher scores. All students, both visa and American, are required to pass the Graduation Writing Test in order to be granted their degree. Certain academic departments may be closed to visa students when it is determined they have inadequate space to meet the needs of California residents.
3. Applicants who have not completed any schooling beyond the twelfth year must submit transcripts for all studies or examinations completed in the tenth through twelfth years of schooling.
4. 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.
5. Visa students who were granted F or J visas on the basis of their admission to another college or university are expected to complete at least one quarter or semester at that institution. Visa 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.
6. Permission to transfer from one school to another must be obtained in accordance with the regulations of the United States Immigration Service.

7. The U.S. Immigration Service requires undergraduate F or J visa students to carry a minimum study load of 12 quarter units. Visa students in graduate programs must carry not less than 8 units.
   The records office will routinely notify the Immigration Service of those students who fail to comply with this requirement. Students are also subject to disqualification for failing to make satisfactory progress.
8. All F or J visa students are required to carry health insurance.

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 more than two quarters during a calendar year (including 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 and has not been enrolled for more than two quarters during a calendar year (including summer) must file an application for re-admission as a returning disqualified student.

Returning students who have previously been enrolled at Cal Poly but have not been enrolled for 5 years or more will be required to submit new transcripts from all previous institutions attended in order to be re-admitted. Transcripts from previous institutions attended which are submitted for admissions purposes will not be maintained beyond 5 years after a student ceases to be enrolled at this institution.

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 or she 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 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 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 applications may be obtained from the Records Office.

Concurrent Enrollment Within CSU

Students enrolled in any California State University 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 Mr. Angel Sandoval (714-869-2608).

Provisional Admission

This Campus may provisionally admit first-time freshmen applicants based on their academic preparation through the junior year of high school and planned for the senior year. California State Polytechnic University, Pomona will monitor the senior year of study to ensure that those so admitted complete their senior year of studies satisfactorily, including the required college preparatory subjects, and graduate from high school.

Details about the Provisional Admission may be obtained from Mr. Arthur Covarrubias (714-869-2989).

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 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 California State University is found in *Education Code* Sections 68000–68090, 68121, 68123, 68124, 89705–89707.5, and 90408, and in Title 5 of the *California Code of Regulations,* Sections 41900–41912. 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.

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 parent with whom the minor maintains or last maintained 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 married person may establish his or her residence independent of spouse.

An alien may establish his or her residence, unless precluded by the Immigration and Nationality Act from establishing domicile in the United States. An unmarried minor alien derives his or her residence from the parent with whom the minor maintains or last maintained his or her place of abode.

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 are:

Quarter Term Campuses

Fall	September 20
Winter	January 5
Spring	April 1
Summer	July 1

Semester Term Campuses

Fall	September 20
Winter (Stanislaus only)	January 5
Spring	January 25

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. Minors 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. 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.
6. Dependent children of a California resident who has been a California resident for the most recent year. This exception continues until the student has resided in the state the minimum time necessary to become a resident, so long as continuous attendance is maintained at an institution.
7. Graduates of any school located in California that is operated by the United States Bureau of Indian Affairs, including, but not limited to, the Sherman Indian High School. The exception continues so long as continuous attendance is maintained by the student at an institution.
8. Certain credentialed, full-time employees of California school districts.
9. Full-time State University employees and their children and spouses; State employees assigned to work outside the State 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 one year.
10. Certain exchange students.
11. 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 campus decision 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, CA 90802-4275

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 Code of Regulations.* 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 Code of Regulations,* 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.

TEACHER CREDENTIAL PROGRAMS (See also School of Education section)

GENERAL INFORMATION

The University is authorized by the Commission on Teacher Credentialing to recommend qualified teacher candidates for the Multiple Subject (Elementary) and the Single Subject (Secondary) teaching credentials under the credentialing provisions of the Ryan Act. All students seeking credentials must meet both Commission and University-approved program requirements.

Multiple and Single Subject student candidates must take the California Basic Educational Skills Test prior to being admitted to the Teacher Education Program and must successfully pass the CBEST prior to applying for the credential. Candidates applying for admission to the program must provide evidence of completing a supervised, qualitative early field experience in a school setting. Experience obtained through coursework, employment of volunteer activities may be acceptable. Candidates are urged to obtain early advisement to obtain assistance in identifying acceptable alternatives for meeting the requirement and other prerequisites to program admission. Early field experience may be met in any one of three ways:

- Document qualifying prior experience; or
- Work in a public school classroom under the supervision of a certified teacher; or
- Take EDU 301, Introduction to Schooling.

The prospective elementary or secondary teacher must choose a major, be accepted in the Teacher Education Program, and complete the professional education program (EDU) in order to gain university recommendation for the Multiple Subject or Single Subject credential. Majors offered for credentials are:

MULTIPLE SUBJECT MAJOR

Liberal Studies (Elementary School Teaching). See department chair for further information, Bldg. 5, Room 253, (714) 869-3566.

Persons with majors other than Liberal Studies who plan to teach in the elementary school must take and pass the Core Battery-General Knowledge Section of the National Teacher Examination PRIOR to applying to student teaching component of the TEP Program or complete a Liberal Studies degree waiver program with no more than four (4) courses remaining PRIOR to student teaching. The Liberal Studies Chair can also provide pre-program advice to students even though they may plan to major in other degree majors.

SINGLE SUBJECT MAJORS

(Secondary School Teaching) See respective department chair for further information:

Agriculture
Art
Behavioral Sciences
Business
English: Communication
Drama/Theatre
English
History
Home Economics
Life Science: Biology
Mathematics
Music
Physical Education
Physical Science: Chemistry
Physics
Earth Science
Social Science: Anthropology
Geography

The curriculum for these majors is listed in the catalog under the appropriate departments.

The National Teachers Examinations (NTE) Specialty area(s) may be taken in addition to or in lieu of the major(s) listed above.

COURSES REQUIRED FOR CREDENTIAL PROGRAMS (Subject to Change)

In addition to courses required for the major, students must take units of professional education courses (EDU) to gain University recommendation for the appropriate teaching credential. Please consult the designated multiple/single subject credential advisors for complete information, School of Education, Bldg. 5, Room 228, (714) 869-2300.

Normally, students begin the professional education course series (EDU) when they are beginning juniors, although EDU 301, Introduction to Schooling, is designed especially to provide appropriate experiences for lower division students. A list of the required professional education courses in the series is available in the School of Education.

ADMISSION TO CANDIDACY FOR A TEACHING CREDENTIAL:

Admission to the University is not equivalent to being admitted to the Teacher Education Program. A candidate seeking University recommendation for a teaching credential is selected through a three-step process involving university-wide teacher education committees. These committees review the qualifications of the candidate and recommend action for:

1) Formal admission to the program;
2) Formal admission to student teaching; and
3) Application for the credential.

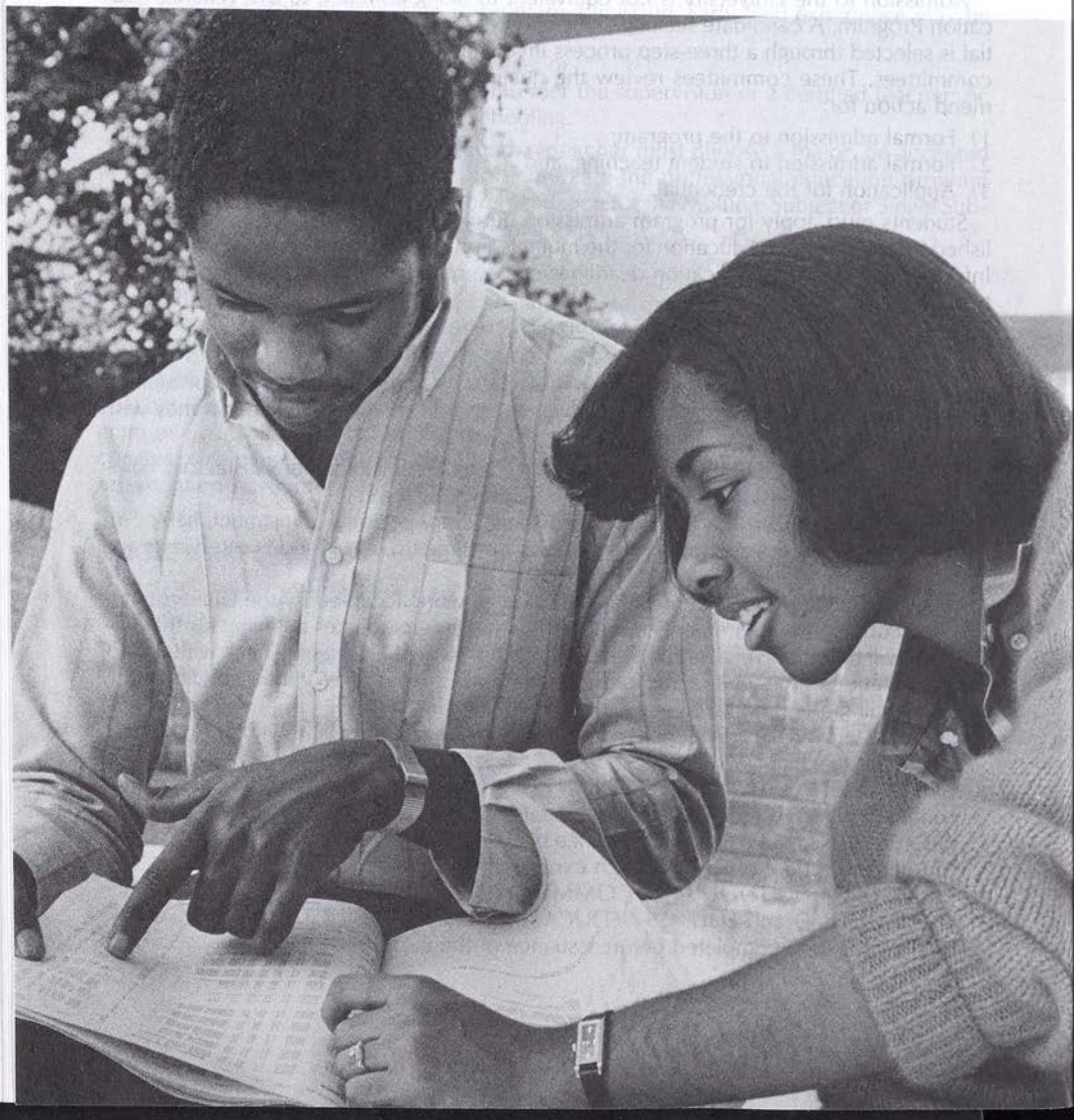
Students must apply for program admission during the open admission period established by the School of Education for the multiple and single subject credential programs. Information regarding application deadlines can be obtained from the School of Education.

Evaluation of the student's qualifications as a credential candidate is based on the following factors:

1. BACHELOR'S DEGREE: Possession of a bachelor's degree substantially equivalent to that of California State Polytechnic University, Pomona in the discipline that they wish to enter.
2. PREREQUISITE COURSES AND FIELD EXPERIENCE: Evidence of satisfactory completion of prerequisite courses and early field experience.
3. PERSONAL ADJUSTMENT: Evidence of satisfactory personal adjustment, habits, interests, and attitudes as shown by evaluation instruments, observations, interviews and faculty ratings.
4. SCHOLARSHIP: Satisfactory scholarship on all work accepted by the University toward curriculum requirements must be evident. Undergraduates applying for the program will have an overall grade point average based on their major. Check with School of Education office for specific information. In all courses taken during the fifth year, an overall grade point average of 3.00 must be maintained.
5. PHYSICAL FITNESS: Evidence of good physical health, to be shown before the time of student teaching.
6. GENERAL EDUCATION REQUIREMENTS: Satisfactory grades and progress toward completing degree requirements in general education and the selected major.
7. PROFESSIONAL ATTITUDE: Evidence of ability and willingness to work with pupils, parents and school officials through experience in working with youth activities.
8. PE 441/442—SCHOOL AND COMMUNITY HEALTH, EDU 454—THE EXCEPTIONAL CHILD and EDU 455—EDUCATIONAL COMPUTER TECHNOLOGY SCIENCE: Must be completed before issuance of the clear credential.

9. CALIFORNIA BASIC EDUCATION SKILLS TEST (CBEST): All candidates (undergraduate and graduate) will be required to pass the CBEST prior to applying for an initial credential.
10. The GWT is required by the University for all baccalaureate and master's degrees. However, graduate students seeking a credential only are not required to take the GWT.
11. *U.S. Constitution:* Verification of knowledge of the *United States Constitution* by passing a college-level examination or taking a college-level course (PLS 201—Introduction to American Government) in this subject.

Note: Changes in the State and California State University requirements for teacher preparation are being contemplated. These changes may have a major impact on the course requirement, GPA, etc. needed to enter Cal Poly's Teacher Education program for both single and multiple subject credentials subsequent to the publication of this catalog. For up-to-date information please contact the School of Education (714-869-2300).



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 Cashier's Office not later than the deadline date indicated on the fee statement. Postmarked dates are not acceptable.

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 Bronco 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 at the Records Office, and fees paid. A student may not be admitted to a course unless properly registered in the university.

DUAL ENROLLMENT

Intrasystem Concurrent Enrollment Program: The California State University allows a student to be enrolled at more than one CSU campus concurrently as long as full fees have been paid at the home campus. For requirements, procedures and forms inquire at the Records Office.

Dual Registration: A student who is registered at another accredited institution while registered at this university must file an academic petition for dual registration. No credit will be granted for work taken at another college concurrent with work at this university unless this petition has been approved prior to the dual registration. 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 college 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. Credit will *not* be granted for coursework taken in excess of 20 units without an approved petition. Coursework taken above the amount approved on the "Petition to Carry an Excess Load" will not be allowed for credit.

ENGLISH PLACEMENT EXAMINATION (EPT)

All entering students 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)

All entering students must take the ELM. Exceptions to this rule are listed in catalog section "Requirements for Bachelor's Degree." Students who do not take the ELM, and who are not excused from taking the examination, will not be able to enroll in any math 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.

MATH DIAGNOSTIC TEST

Effective fall 1984, students are required to take the Math Diagnostic Test prior to entering in any Math remedial or G.E. credit course. For details see the Mathematics Department.

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. Pre-registered students who do not appear in class the first day of the quarter (no-shows) are ordinarily dropped from the class roll by the instructor. However, the responsibility for properly dropping classes ultimately rests with each student. 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. Students may add or drop a class without penalty (no entry on student's record) through the 5th CALENDAR DAY of the quarter, with the signature of the instructor. After the 15th day and up to the beginning of the last three weeks of instruction, students may petition to drop a class 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 college 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 may be approved for: emotional disturbance which requires professional consultation (verification may be required); serious illness or accident resulting in considerable loss of time (verification may be required); and/or financial difficulty or other personal problems of a serious nature which require withdrawal from the university or reduction in load (verification may be 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. If a student does not have a validated withdrawal petition on file in the Records Office, the "W" grade will not appear on the final grade report. The administrative grade of "U" will be shown. For explanation of these grading symbols, see catalog section "Grading System". A student may improve the GPA, as a consequence of his or her 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 (Program Change Form), 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.

Courses may be added for Audit only during the add period (1st through 8th day). There is no preregistration to audit a course. Once a student has decided to audit a course *or* take a course for credit, the student cannot switch this status. The student's college dean must approve the decision for a student who has audited a class to subsequently repeat that course for credit.

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 may 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 Code of Regulations.*

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. Only students in good standing are eligible for a leave of absence.

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 chair, 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 reinstated in good standing. 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 prescheduling of continuing students for that quarter.

The reason for requesting a leave must be stated completely and clearly. Students may petition for a leave of absence for such reasons as: *professional or academic opportunities,* like travel or study abroad, employment related to educational goals and major fields of study, or participation in field study or research projects; *medical reasons,* including pregnancy, major surgery, or other health-related circumstances; and *financial reasons,* such as the necessity to work for a specified period in order to resume study with adequate resources. 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 re-enrollment.

Students may "stop-out" without filing for a leave of absence as long as they attend any two quarters (including summer) during a calendar year.

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 University Advising Center #1, 1-113. 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. Students who withdraw from the quarter after the 5th day of classes will receive a "withdrawal" on their permanent records. The grading policy for students who withdraw from the university after the 7th week of classes is the same as for students who drop courses after this date (see Adding or Dropping Courses).

RETURN TO UNIVERSITY

Effective Winter, 1988, returning Cal Poly students who have not maintained continuous enrollment and have no more than 24 quarter units left to take, will:

1) Reapply to the University;
2) File a petition to be allowed to complete requirements on the curriculum being followed when last enrolled.;
3) If petition approved, finish all courses left to take on designated curriculum;
4) Take the upper division General Education package (Category VII);
5) Take and pass the Graduation Writing Test;
6) Apply to graduate at the proper time.

Students must have no more than a total of 36 units to take under this policy; 24 (or less) from the curriculum plus 12 for the Category VII package, if not already completed.

If a student's record does not meet the requirements of this policy, the student must reapply to the university and follow the current curriculum. If petition (#2) is denied, the student must follow the current curriculum when re-enrolling.

If a student wishes to complete requirements at another institution, that work must be completed in one (1) semester or two (2) quarters.

REFUNDS

Any student who withdraws from the university or drops to 6.0 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. The actual refund deadlines are posted in the class schedule each quarter.

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 in which they are not interested, to change to another major. In such cases, students should consult their advisers and the Advising Center for assistance in making the changes. Students enrolled under certain laws must obtain approval by the Veterans Ad-

ministration before a change of major can be made.

Transfer from one major to another does not in any way change the student's scholastic standing, nor does it constitute a break in continuous enrollment. However, students who change major are subject to the core and support requirements in effect at the time of the change of major.

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 REGULATIONS

An undergraduate student remaining in attendance in regular sessions at any California State University campus including Cal Poly Pomona, at any California community college, or any combination of California community colleges and campuses of The California State University may for purposes of meeting graduation requirements elect to meet the requirements in effect at the campus from which the student will graduate either (1) at the time the student began such attendance or (2) at the time of entrance to Cal Poly Pomona, or (3) at the time of graduation. Cal Poly campus authorities may authorize or require substitutions for discontinued courses and may require a student changing his or her major or any minor field of study to complete the major or minor requirements in effect at the time of the change.

For purposes of this section "attendance" means attendance in at least one semester or two quarters each calendar year (January 1 through December 31). Absence due to an approved educational leave or for attendance at another accredited institution of higher learning shall not be considered an interruption in attendance, if the absence does not exceed two years.

Cal Poly Pomona may prescribe that particular academic requirements be met within as few as seven years of the date of award of the degree.

For additional information on compliance see the Associate Vice President for Academic Programs (Bld. 1, Room 221, (714) 869-3330).

FULL-TIME EQUIVALENT AND FULL-TIME STUDENT

Enrollment in the California State University 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, social security benefits, athletic eligibility and other financial aids when enrolled for twelve units of credit. A full-time student is not necessarily a full-time equivalent (FTE) 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. 1232(g)) and regulations adopted thereunder (34 C.F.R. 99) and *California Code of Regulations,* 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 access to student records maintained by the campus, and the release of such records. In brief, the law provides that the campus must provide students access to records directly related to the student and provide the student with 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 Office of the Associate Vice President for Student Support Programs. 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 above 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 the Office of the Associate Vice President for Student Support Programs.

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.

* 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, 1990–91 (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: $55

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

Units	*Per Semester*	*Per Quarter*	*Per Academic Year*
All Students:			
0 to 6.0	$213	$142	$426
6.1 or more	$372	$248	$744

Nonresident Students (U.S. and foreign)

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

	Quarter	**Semester**
Charge Per Unit	$126	$189

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.*

MISCELLANEOUS FEES (Subject to change)

Application to the university (charged of all applicants—payable by check or money order at time of applying—*nonrefundable*)	$55.00
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
Commencement (not a state fee, mandatory, non-refundable)	
Bachelor's degree	10.00
Master's degree	10.00
Diploma Fee	8.00
Health facility fee (per quarter)	2.00
I.D. card (nonrefundable one time charge)	5.00
Late registration	25.00
Late registration fee for adding courses beyond deadline (per class)	10.00

Library	See schedule in library
Parking fee (per quarter)	
Automobiles	36.00
Motorcycles/Mopeds	9.00
Transcript of record	4.00
Associated Students, Inc. membership fee (not a state fee)	
Fall quarter	16.00
Winter, Spring quarter, each	10.00
Summer 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
American Dietetics Association Transcript Evaluation Fee	
Enrolled students	20.00
Non-Cal Poly students	25.00
Credential Evaluation (non-Cal Poly students)	25.00
Credential Processing Fee	25.00
Education Code, Section 23801	
Education Code, Section 23805	
Sponsored Program Fee per quarter (for certain foreign students only)	150.00

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.) There may be specially related fees in selected courses. Such fees will be listed in the course description.

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 ½ 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 ½ approval of students voting on a referendum called for by a petition signed by 10% of the regularly enrolled students. (*California Code of Regulations,* 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 increase approved by a majority of the students voting. 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 Code of Regulations.* Students must apply for a refund, and in all cases it is important to apply quickly. Forms may be obtained in the Records Office. All refund requests are processed according to the deadlines posted each quarter. Information concerning any aspect of the refund of fees may be obtained from the Office of the Associate Vice President for Student Support Programs (Bldg. 1—Room 106).

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 $1,650 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 $4,080 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	$16
(Winter & Spring—$10, Summer—$5)	
State University Fee	
Undergraduate	
0-6.0 units	142
6.1 and over	248
Graduate	
0-6.0 units	142
6.1 and over	248
Room and board (19 meals per week—1989–90 double occupancy)	3860*
Books and supplies (estimated)	250
Parking	36*
Health 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 Code of Regulations,* 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 and Residence Life

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.

Students should inquire about on-campus housing directly with the Housing Office. Students may call the Housing Office or mail their requests to receive information. 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. 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), or call (714) 869-3307

The University Village Apartments are also available for Cal Poly Pomona students. Students wishing to inquire about the apartments should contact the University Village at (714) 595-2995.

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 COST OF EDUCATION AND SOURCES OF FUNDS PER FULL-TIME EQUIVALENT STUDENT

The 20 campuses and the Chancellor's Office of The California State University are financed primarily through funding provided by the taxpayers of California. The total State appropriation to the CSU for 1989/90, including capital outlay and employee compensation increases, is $1,831,731,000. The total cost of education for CSU, however, is $2,023,455,068 which provides support for a projected 267,380 full-time equivalent (FTE)[a] students.

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[a] For budgetary purposes, full-time equivalent (FTE) translates total head count into total academic student load equivalent to 15 units per term. Some students enroll for more than 15 units; some students enroll for fewer than 15 units.

The total cost of education in the CSU is defined as the expenditures for current operations, including payments made to the students in the form of financial aid, and all fully reimbursed programs contained in state appropriations, but excluding capital outlay appropriations. The average cost of education is determined by dividing the total cost by the total FTEs. The average cost is further differentiated into three categories: State Support (the State appropriation, excluding capital outlay), Student Fee Support, and Support from Other Sources (including Federal Funds).

Thus, excluding costs which relate to capital outlay (i.e., building amortization), the average cost of education per FTE student is $7,568. Of this amount, the average student fee support per FTE is $1,106. The calculation for this latter amount includes the amount paid by nonresident students.

SOURCE OF FUNDS AND AVERAGE COSTS FOR 1989/90 CSU BUDGET (PROJECTED ENROLLMENT: 267,380 FTE)

	Amount	Average Cost Per Student (FTE) [a]	Percentage
Total Cost of Education	$2,023,455,068 [b]	$7,568	100.0
—State Appropriation	1,644,823,000 [c]	6,152	81.0
—Student Fee Support	295,759,156	1,106 [d]	15.0
—Support from Other Sources	82,872,912	310	4.0

[a] For budgetary purposes, full-time equivalent (FTE) translates total head count into total academic student load equivalent to 15 units per term. Some students enroll for more than 15 units; some students enroll for fewer than 15 units.

[b] The total cost of education does not include the amount related to lottery and the capital investment of the CSU. The estimated replacement cost of all the system's permanent facilities and equipment on the 20 campuses is currently valued at $6.5 billion, excluding the cost of land.

[c] This figure does not include the capital outlay appropriation of $186,908,000.

[d] The average costs paid by a student include the State University Fee, Application Fee, and Nonresident Tuition. Individual students may pay less than $1,106 depending on whether they are part-time, full-time, resident or nonresident students.

SERVICES

Health and Psychological Services

Student Health and Psychological Services have been combined to provide a more comprehensive and holistic approach in dealing with the physical and emotional needs of our students.

Medical

Health services provide for all registered students, on an outpatient basis, medical care usually provided by a primary physician. This includes routine laboratory, x-ray and physical therapy services. Limited pharmaceutical services are also available. Any outside care, whether referred by the Health Services or not, is at the student's expense. Students are strongly urged to have coverage with comprehensive medical insurance. Services are available Monday through Thursday, 8 a.m.–5 p.m., Friday, 8 a.m.–4:45 p.m., except for holidays. Somewhat limited services are available Monday through Thursday, 5–6 p.m.

Psychological

Professional counselors are available in the Psychological Services Center for the purpose of providing students with the opportunity for confidential discussions about personal and social 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 by appointments and can be scheduled from 8:00 a.m. to 5:00 p.m. or as pre-arranged with the counselor. Emergency time is made available each day.

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

Office of Academic Testing

The Testing Center is responsible for all university and state academic mandated testing such as the English Placement Test, Graduation Writing Test, and Entry-Level Math Test. The Office of Academic Testing also provides registration information for entrance tests (SAT and ACT), and the CBEST.

Center for Orientation and Developmental Programs

Orientation programs for new freshman, transfer and graduate students are conducted prior to the start of each quarter, with an expanded series of programs during the summer for those entering in the fall quarter. A limited number of two day overnight orientations in the university dormitories and Parent Orientations are also conducted during the summer. Dependent upon date of admission, these programs generally provide an opportunity for new students to pre-schedule their classes for their first quarter. All of these programs also offer students an introduction to the campus, to student services, and to the academic programs related to their majors. Every effort is made to provide new students with information and advice which will facilitate a smooth and effective beginning at Cal Poly.

Other services of the Center relate to the intellectual and psycho-social development of the individual student. A research component is designed to identify and evaluate those factors in the university environment which facilitate or impede this development.

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 college and by department. Students are advised to check with their major department office to familiarize themselves with the advising program adopted by their department.

University Advising Centers

There are two convenient locations for general student information and advising services: one is in Building 95 (The Duplex) across from the Commuter Cafeteria and the other is in Room 113 of Building 1 (The Administration Bldg.). Both Centers provide backup advising services for the colleges and the departments and can handle all inquiries—no question is too small or too complicated. If a staff advisor cannot answer your questions directly, he or she will find the answer for you or refer you to the appropriate person who can. Bldg. 95 (The Duplex), (714) 869-3254, is the central office for undeclared majors. Undeclared undergraduates obtain their permits to register here and work with their assigned advisor to select a major before the end of the academic year. Rm. 113 in the Administration Bldg., (714) 869-3211, is the stop-in Center for students who are planning to withdraw from classes, from the quarter, or from school and for students who are planning to change their major. Withdrawal Forms and Change of Major Petitions originate in this office so that students who wish to talk with someone about their plans can meet with an academic counselor.

Center For Re-Entry And Transition

The Center for ReEntry and Transition is located in Building 95 across from the Commuter Cafeteria. It has two main program areas: ReEntry Services and Women's Programs. ReEntry Services includes a range of workshops and services tailored to the specific needs of students, those 25 years or older as well as those just beginning or continuing college work after being away for several years.

Liaisons are available from every student service and support area as well as peer advocates and volunteers to meet with interested and incoming students. Contact the Center directly for an appointment at (714) 869-3206. Evening appointments are available. For more information about Adult Student Special Admissions see page 32.

Our Women's Program is over 10 years old and provides workshops, groups, educational resource materials, and a library that offers to our visitors a variety of topics and issues related to the changing roles of men and women in our society. Academic internships are also available.

The Center offers a relaxing, home-like atmosphere where students can stop for a few minutes, talk, study, or simply rest. Community guests interested in returning to school are also welcome!

Science Advisory Office

Dr. David F. Steele, Chief Health Professions Advisor, College of Science Advisory Office, provides academic advising to all students majoring in the College of Science. He

also advises 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 office is located in 8-4; call (714) 869-3434 for information.

Center for Science and Mathematics Education

The Center's purpose is to contribute to the improvement of science and mathematics education in elementary and secondary schools. To this end it coordinates workshops and courses for K--12 teachers and also provides teachers with equipment and other materials for use in their classrooms.

Dr. Judith Jacobs, Director, is located in 3-220; call (714) 869-3473 for information.

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, CA 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 Services

Disabled Student Services provides support services to-students who have physical or functional disabilities. Disabled Student Services provides assistance to students with disabilities such as: visual, hearing, mobility, motor, and speech impairments. This Office also services students who have learning disabilities or have emotional disabilities.

Disabled Student Services offers a comprehensive and well-coordinated system of educational support services. Some of the educational support services offered to students with disability are: reader services, notetaker services, test proctoring services, interpreter services for the hearing impaired, priority registration, use of specialized equipment, and peer tutoring.

These services and others are available to students with disabilities and to faculty and staff who assist them and request services from Disabled Student Services. The University campus and classrooms are program accessible.

For further information regarding services for students with disabilities, contact the Director of Disabled Student Services in the Library (Building #15), Room 126, (714) 869-3333, Voice/TDD.

The Career Center

The Career Center assists students with career planning, major choice, student employment and with career job search. A wide variety of written support materials are available for students and alumni. The Career Center is located in 97-100. For information, call (714) 869-2340.

The Center assists students in the development of their career goals and in choosing an academic major. The Center has an extensive library of career planning resources. Two interactive, computerized career planning systems, SIGI PLUS and DISCOVER, are available. Both assist students in assessing work related interests and values, in locating occupations that match interests and values, in gaining occupational information, in identyfying skills required, in determining the best methods of preparation, in identifying strategies for coping with barriers and other career related problems, in learning a deci-

sion making process and in planning a course of action. The staff can assist in selection of the best system for each individual.

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), please 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 resume and the assembling of references for the professional file.

Most services are provided without charge to alumni for one year after graduation. After the one-year grace period, a twenty-five dollar annual fee is charged.

CAREER PLACEMENT INFORMATION

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

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, CA 91768, (714) 869-3700.

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 six units per quarter.

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 January 1. Priority will be given to those students who mail their application by March 2 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. If selected for verification, 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 student's Federal Income Tax Form 1040. 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 thoughtful 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 letters of recommendation. Deadlines for the scholarships are March 2 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. Information on each scholarship is available from the Financial Aid Office. Deadline to apply for university scholarships is April 30th each year.
   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. The reference section in the Library also contains additional information.

      Many major U.S. companies offer scholarships to their employees and to the children of their employees. The student is encouraged to research these possibilities.

      Academic departments also provide another source of information. Check with your department chair or secretary for meritorious scholarships within your major.
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 undergraduate students enrolled in 6 units or more and to graduate students enrolled in 4 units or more. All students must be residents of the State of California. The award is based on need and the amount of the award is dependent on the amount of the State University Fee charged to students. The maximum award varies each 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 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 March 2 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. Carl D. Perkins 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 principal 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) or nine (9) months after graduation.
   B. Stafford Loan (formerly known as a Guaranteed Student Loan—GSL). Funded by private lending agencies with guarantees provided by the Federal government. Eight (8) percent interest is charged and minimum monthly payments to begin (6) months after graduation. Eligibility for Pell Grant must first be determined before a Stafford Loan can be processed. Workshops are required for first time borrowers and graduates.
   C. Supplemental Loans for Students—SLS is a federally-sponsored loan program for students. It must be repaid in full by the student-borrower. Eligibility for Pell Grant and a determination of need for a Stafford loan are prerequisite prior to certification of a SLS. Annual loan limit $4,000.00.
   D. Parents Loan for Undergraduate Students—PLUS is a federally-sponsored loan program for parents on behalf of their dependents. A loan must be repaid in full with interest by the parent-borrower. Loan subject to credit analysis by the lending institution. Annual loan limit is $4,000.00.
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.
   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 $250, 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) 869-3700.

1. Student financial assistance programs available to students who enroll at Cal Poly Pomona;
2. The method by which such assistance is distributed among recipients who enroll at Cal Poly Pomona.
3. The means, including forms, by which application for student financial assistance is made and the requirement for accurately preparing such applications;
4. The rights and responsibilities of students receiving financial assistance; and
5. The standards the student must maintain 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) 869-2989.

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 expressed 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) 869-3426.

Information concerning the academic programs of Cal Poly Pomona may be obtained from the Associate Vice President for Academic Programs, Building 1, Room 221, (714) 869-3330, 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 expressed 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) 869-3268.

OFFICE OF STUDENT OUTREACH AND RECRUITMENT

The Office of Student Outreach and Recruitment coordinates all activities and programs related to providing Cal Poly admission information and assistance to prospective students and their parents, and to counselors at schools and community colleges. The department's efforts are closely linked with the University's enrollment management activities.

Five activity areas comprise the department. Outreach and Recruitment provides regular visitations and information programs to high schools and community colleges in Cal Poly's surrounding region, ranging from CSU admission information to career workshops. Also included are Student Affirmative Action services to high schools with high proportions of underrepresented students. Transfer Outreach provides service to two state-funded Transfer Centers, generates transfer admission agreements, and offers general transfer advising services, both on and off campus. The Articulation unit produces annual course articulation agreements in consultation with feeder community colleges and Cal Poly academic officials and faculty, and also coordinates Project ASSIST. The Special Projects unit includes Step to College, Summer Intensive Orientation Programs, and early outreach activities and parent programs for junior high and middle schools. Graduate Outreach combines graduate recruitment services with the administration of the Presidential Fellowship program for underrepresented post-baccalaureate students.

Office of Research and Information Management

The Office of Research and Information Management for Student Support Programs provides research services and systems support related to the area of student affairs. This includes research design, data analysis, and reporting. Consultation for other projects, such as survey development and analysis is also available. Contact the Director of Research and Information Management for Student Support Programs at (714) 869-3357 for more information.

Children's Center

The Associated Students Children's Center assists students who are parents maintain their enrollment at Cal Poly by providing quality child care for their preschool children (2 ½ to 5 years and toilet trained) at a nominal cost. The Center also accommodates children of faculty and staff on a space available basis.

The Center's philosophy is learning through play. All curriculum areas are introduced but children are not forced to participate. Socialization is stressed.

The Center is open during the academic year (Monday through Friday, 8:30 a.m. to 6 p.m.). Applications and additional information regarding fees and space availability may be obtained by calling the Children's Center at (714) 869-2284.

STUDENT LIFE AND ACTIVITIES

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.

Office of Student Life

The Office of Student Life supports the mission of the University by helping students prepare for life beyond Cal Poly, fostering a sense of belonging to the University community, and complementing the classroom experience. Through its programs and facilities, it supports students involved in co-curricular activities, community service, and University and student governance, thus enhancing the quality of their lives.

While the Office of Student Life's purpose is to serve the entire University community, students are its highest priority. Appreciating the diverse backgrounds and needs of the Cal Poly community, programs and services are offered for the general student body and distinct populations such as women, ethnic students, and re-entry adults. Student families, potential students, the surrounding communities, and employers are also served by the Office. The goals of the Office are met through activities such as ASI advisement, leadership education and resources, co-curricular clubs and organizations, attention to women's concerns, multi-cultural programming, services for re-entry students, and supporting volunteerism both on and off campus. In each of these activities, the staff of the Office of Student Life seeks to aid development in each student's physical, emotional, intellectual, spiritual, environmental, and social life.

The Office of Student Life offers the opportunity for such experiences to be gained through involvement in various co-curricular programs including participation in institutional governance, clubs or organizations or special committees, recreational or cultural endeavors and the planning and production of programs of entertainment and enlightenment. A recent addition to the office is a Human Corps Volunteer Center which provides volunteers for humanitarian-oriented community service.

Student Government and Organizations

Each student, by virtue of paying a mandatory membership fee which varies per quarter, is a member of the Associated Student, Incorporated. ASI is an officially recognized auxiliary of the University and is involved with representing student interests on campus as well as providing a variety of services. ASI Senate, the legislative body of student government, includes representation from each of the colleges on campus, as well as a graduate representative and three at-large senators. The Cabinet works closely with the President and Vice-President in establishing direction through the Executive branch of student government. Various boards supervise publications, athletics, finances, activity programs, the University Union, and Poly Vue, the campus-wide open house held each spring.

ASI Programming provides entertainment and special interest programs to the student body and the general public. Through rock concerts, speakers, fine arts programming, comedy, jazz, and film programs, the students in ASI Programming seek to provide a well-rounded and complete schedule of activities. The Associated Students, Incorporated also provides a Children's Center, providing day care for children of Cal Poly students, faculty, and staff, a Learning Resource Center, Women's programs, the Recreation Services Center, a legal services program and an insurance program which offers health and dental benefits.

Offices of ASI are located in the Union Plaza, Bldg. 26, while the ASI/UU Business Office is in the University Union, Bldg. 35. Advisement of ASI is provided by the Office of Student Life, also located in Bldg. 26.

Student Clubs and Organizations

Cal Poly's co-curricular program is strengthened by over 200 chartered clubs and organizations, ranging from 94 departmental clubs to the six sports clubs. Also offered are special interest clubs, honorary organizations, fraternities and sororities, multi-ethnic, religious, and international organizations. New clubs are formed annually as student interests change and evolve. Students interested in becoming part of a club are encouraged to complete a "Co-Curricular Interest Survey" available in the Office of Student Life in the Union Plaza.

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 Office of Student Life, both of which are located in Union Plaza.

Music, Drama, Dance, Forensics

Opportunities are provided for students to participate in theatrical or dance 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. Intercollegiate competition as well as local events are featured in a strong forensics program. The annual Student-Faculty dance production is presented each spring quarter.

Recreation Services Center

The ASI Recreation Services Center provides low cost backpack and camping equipment rental, inexpensive planned outings and seminars, retail sales, a recreation information and resource library and many other services related to outdoor leisure activities. The Center is located between the Union Plaza and the Bronco Bookstore, in the University Park area.

Intercollegiate Athletics

Intercollegiate Athletics is an integral part of the university life and encourages student-athletes to excel academically as well as athletically. Intercollegiate competitition is conducted under the policies and procedures of the NCAA, which includes admission levels for participation, with either a minimum S.A.T. score of 700 or an A.C.T. score of 18. A 2.0 gpa in a core curriculum is also required. The intercollegiate program is guided by an athletic board which is composed of Cal Poly faculty and students. A program of intercollegiate competitition for men and women is offered in a variety of sports which include softball, volleyball, tennis, basketball, baseball, soccer, cross-country, track and field.

Club Sports

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 Office of Student Life in Union Plaza. An extensive in-

tramural 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 responsibilities 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, Office of Student Life 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. A student-athlete must maintain a GPA of 2.0 and complete 36 units of work towards a specified major prior to the beginning of the next competitive season. 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 Registrar 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 Code of Regulations,* 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. Proce-

dures 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 Associate Vice President for Student Affairs.

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

Article 1.1, Title 5, *California Code of Regulations*

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 actions taken under this section.

Student Rights and Responsibilities

All members of the university faculty and staff have a primary mission of helping students to make progress toward a degree or credential. Nevertheless, *each student is individually responsible for meeting all university requirements and deadlines*, as presented in this publication and any other announcements of the university, center or department in which he/she is enrolled.

The University intends that every member of the campus community be afforded a work and study environment free of discrimination based on race, color, religion, national origin, sex, sexual preference, marital status, pregnancy, age, disability or veteran status. All persons are to be protected from abusive or harassing behavior.

Information regarding student rights and responsibilities and grievance procedures can be found in the *"Statement of Student Rights, Responsibilities, and Student Grievance Procedures"*, copies of which are available in the office of the Associate Vice President for Student Affairs, Bldg. 1, Room 106, (714) 869-3358 or the Director of Affirmative Action Services, Bldg. 1, Room 110J, (714) 869-2047 and Department and College Dean's Offices.

Academic Integrity

The University is committed to maintaining academic integrity throughout the University community. Academic dishonesty is a serious offense that can diminish the quality of scholarship, the academic environment, the academic reputation, and the quality of a Cal Poly degree. The following policy is intended to define clearly academic dishonesty at Cal Poly and to state the responsibility of students, faculty and administrators relating to this subject.

All forms of academic dishonesty at Cal Poly are a violation of University policy and will be considered a serious offense. Academic dishonesty includes but is not limited to:

a. Plagiarism—Plagiarism is intentionally or knowingly presenting words, ideas or work of others as one's own work. Plagiarism includes copying homework, copying lab reports, copying computer programs, using a work or portion of a work written or created by another but not crediting the source, using one's own work completed in a previous class for credit in another class without permission, paraphrasing another's work without giving credit, and borrowing or using ideas without giving credit.
b. Cheating During Exams—Exam cheating includes unauthorized "crib sheets," copying from another, looking at another student's exam, opening books when not authorized, obtaining advance copies of exams, and having an exam regraded after making changes. Exam cheating includes exams given during classes, final exams and standardized tests such as the GWT and Math Diagnostic Test.
c. Use of Unauthorized Study Aids—This includes utilization of other's computer programs or solutions, copying a copyrighted computer program without permission, using old lab reports, having others perform one's share of lab work, and using any material prohibited by the instructor.
d. Falsifying any University Document—This includes falsifying signatures on University forms, such as Add-Drop and Withdrawal forms, forging another student's signature and falsifying prerequisite requirements.

The responsibility of all students is to be informed of what constitutes academic dishonesty and to follow the policy. A student who is aware of another student's academic dishonesty is encouraged to report the instance to the instructor of the class, the test administrator, or the head of the department within which the course is offered. A student

who is reported by the instructor to the coordinator of student discipline will receive a letter with this accusation.

The responsibility of the faculty, instructor or test administrator is to clarify their positions on academic dishonesty to their classes early in each class. The instructor is encouraged to report each instance of academic dishonesty to the coordinator of student discipline. In addition to reporting each instance, each instructor shall address the problem in the narrow context of the individual class. Any form of academic dishonesty in class could result in a failing grade for the assignment related to the instance or in a failing grade for the class.

The responsibility of the administration is to address the cases of academic dishonesty from the disciplinary standpoint. Each case that is referred to the administration will be reviewed by the Office of Student Discipline and an appropriate action will be taken. As a reasonable norm for an average magnitude offense, a student's first instance of academic dishonesty should result in a probation period with the student's name placed temporarily on file for academic dishonesty and the student will be informed of this. The second report should result in the student being suspended from the University for the quarter and the following quarter, with the student's name placed permanently on file for academic dishonesty. The third instance should result in the end of a student's career at Cal Poly. The administration has the responsibility to ensure that the systemwide guidelines regarding student discipline are met in Cal Poly's attempt to ensure academic integrity.

Prohibition of Sexual Harassment

It is the policy of The California State University that each campus and the Office of the Chancellor maintain a working and learning environment free from sexual harassment of its students, employees and those who apply for student or employee status. All students and employees should be aware that The California State University is concerned and will take action to eliminate sexual harassment. Sexual harassment is conduct subject to disciplinary action.

Sexual harassment includes such behavior as sexual advances, request for sexual favors, and other verbal or physical conduct of a sexual nature directed towards an employee, student, or applicant when one or more of the following circumstances are present:

- Submission to or toleration of the conduct is an explicit or implicit term or condition of appointment, employment, admission or academic evaluation;
- Submission to or rejection of such conduct is used as a basis for a personnel decision or an academic evaluation affecting an individual;
- The conduct has the purpose or effect of interfering with an employee's work performance, or creating an intimidating, hostile, offensive or otherwise adverse working environment;
- The conduct has the purpose or effect of interfering with a student's academic performance, creating an intimidating, hostile, offensive or otherwise adverse learning environment, or adversely affecting any student.

In determining whether conduct constitutes sexual harassment the circumstances surrounding the conduct will be considered.

Established California State University disciplinary, grievance or other complaint procedures, as appropriate, will serve as the mechanism for resolving complaints of sexual harassment. These include the complaint procedures in collective bargaining agreements, Executive Order 419, or student complaint procedures contained in the *Statement of Student Rights, Responsibilities and Student Grievance Procedures*, as appropriate.

Complaints of sexual harassment should be filed with the Director of Affirmative Action Services, Engineering Building 1, Room 110J, (714) 869–2047.

Computer Software Copyright and License Agreement Policy

In order to protect the copyrights of the vendors, proprietary software acquired by the various communities within the University should be used only as described under the specific license agreement negotiated with the particular vendor.

Each individual responsible for the acquisition, rental or lease of desk top computers, capable of executing software programs, will establish procedures to ensure that:

a. Software or firmware acquired for use with the computer under his/her control is not used in violation of any copyrights protection or in violation of any license agreement.
b. Software or firmware acquired for a specific computer is not used on an alternate computer in violation of any copyrights or license agreement.

Smoking Policy

Purpose. In recognition of the health hazards that exist from sidestream or secondhand smoke and in accordance with Section 19262 of the *Government Code*, California State Polytechnic University, Pomona has adopted a policy promoting a smoke-free environment. This policy became effective August 21, 1989.

Policy Guidelines. Smoking is prohibited inside all university facilities and in all vehicles owned or maintained by the university. Facilities leased to and vehicles owned by the ASI or the Cal Poly Kellogg Unit Foundation, Inc., are covered by the smoking policy of the respective auxiliary organization.

Smoking will be allowed within student rooms in the residence halls when students have notified the Housing Office that they are smokers and desire a smoking roommate. When smoking preferences cannot be honored by Housing, and smokers and nonsmokers are placed together, the no-smoking restriction will apply.

Policy Administration and Enforcement. Deans, directors, and department heads are responsible for the administration of this policy. The Associate Vice President for Faculty Affairs and the Director of Personnel Services are available to assist in policy interpretation and to ensure consistent application.

Violations of this policy by employees will be handled through progressive discipline. Student violators will be subject to CSU student disciplinary procedures established pursuant to Section 41301, Title 5, of the *California Code of Regulations.*

Drug-Free Workplace Policy

California State Polytechnic University, Pomona recognizes a responsibility to help provide a safe and productive work environment. The following policy has been developed as a result of a concern regarding the use, sales and manufacture of controlled substances. Such activity can affect employee productivity and safety, damage the reputation of the University and its employees, and violates state and federal laws.

The unlawful manufacture, distribution, dispensation, possession or use of controlled substances is prohibited in the workplace.

The University expects each employee to perform in a safe and productive manner. University employees may not report to work or perform work under the influence of any drug or substance, including alcohol or medically authorized drugs, which will affect work performance, alertness, coordination or the safety of others on the job.

Definition of Controlled Substances

Controlled substances are those defined in schedules I through V of Section 202 of the Controlled Substances Act (21 U.S.C. 812) and further defined in regulation at 21 C.F.R. 1308.11–1308.15. Controlled substances include, but are not limited to, substances such as marijuana, heroin, cocaine, LSD, and amphetamines.

Disciplinary Action

Violations of this policy will result in the following actions:

If an employee covered by this policy is suspected with good reason of manufacturing, distributing, dispensing, possessing or using controlled substances in the workplace, the University will take appropriate investigatory action as provided for in CSU rules, regulations and Memoranda of Understanding.

The University will cooperate fully with enforcement officers in the investigation of such actions.

If the investigation demonstrates that such action did occur, appropriate personnel action will take place up to and including termination. As a condition of continued employment, the University may require an employee covered by this policy to enter into and satisfactorily complete an appropriate treatment program.

Individuals engaged directly in the performance of work pursuant to a federal grant must abide by the stipulations of the University Drug-Free Workplace Statement as required by the Drug-Free Workplace Act of 1988.

The Drug-Free Workplace Act requires that an employee covered by this policy must notify the University of any criminal drug statute conviction for a violation occurring in the workplace. The notification must be no later than five (5) days after such conviction. The University must notify the granting or contracting agency within ten days after receiving such notice. Within thirty (30) days after receiving such notice the University will take appropriate personnel action as outlined above.

Department of Defense Regulations

The Office of the Chancellor of The California State University has asked the Office of General Counsel to review requirements for Department of Defense contractors. When that review is completed, the Office of the Chancellor will provide guidance on compliance and the University will incorporate that information into this Policy statement. (ref: FSR 89-18).

Medically Authorized Drugs

Any employee covered by this policy who is required to use medically prescribed or over the counter drugs while working, which may impair or affect the employee's alertness, coordination or responses, must advise the appropriate supervisor of this fact before reporting for work. It is the employee's responsibility to determine from the physician whether a prescribed or over the counter drug may impair performance. The University reserves the right to require any employee using prescription or over the counter drugs to provide a physician's certification that the use of the drug will not impair proper job performance.

Employee Assistance

An employee covered by this policy may volunteer to participate in an appropriate treatment program or may be directed to do so by the employer. As provided for in CSU rules, regulations and Memoranda of Understanding, the employee may utilize available leave credits or may be placed on a leave of absence for the purpose of rehabilitation. Approval for an employee to return to work will be granted when the employee provides certification of successful completion of an appropriate treatment program. Because rehabilitation programs vary in length, the amount of time granted for participation and completion of approved treatment will be determined on an individual basis.

Employee participation in treatment, whether voluntary or directed, will be considered confidential. Referral services are available from the University Training Officer who coordinates the campus Employee Assistance Program.

Policy Administration

The University Director of Personnel Services or designee is responsible for the administration of this policy. Managers and supervisors are responsible for reporting any incident of suspected abuse to the Director of Personnel Services who will apprise the proper administrators of the incident.

This policy will be reviewed annually by the Director of Personnel Services who will advise the Executive Director of Business Operations as to the status of compliance with the Act.

The Executive Director of Business Operations will affirm compliance and forward the annual certification to the University President for signature and transmittal.

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 $55.00 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 Reserve Officers' Training Corps (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 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 military experience or 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 camp should apply to the Army ROTC, California State Polytechnic University, Pomona campus during the spring preceding the summer Basic camp.

Army ROTC scholarships for full tuition, fees, books, and a $100.00 monthly living allowance are offered to students who are enrolled or are preparing to enroll in Army ROTC. These scholarships are for periods of four, three and two years. Four-year scholarships are awarded to U.S. citizens entering college for the first time. Recipients must attend one of 280 host institutions nationwide. Three-year and two-year competitive scholarships are available to students attending college at the time of application; this in-

cludes students enrolled in the Cal Poly Army ROTC program. Applications and further information can be obtained by writing Army ROTC, California State Polytechnic University, Pomona, CA 91768, or by calling (714) 594-3080 or (714) 869-3266.

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

Air Force ROTC

The Air Force Reserve Officer Training Corps program is offered through four schools in the Los Angeles area: California State University, Long Beach; Loyola Marymount University; University of California at Los Angeles; and the University of Southern California. Contact any of the ROTC detachments for information about schedules and fees at the numbers below.

CSU Long Beach	714-985-5743
Loyola Marymount University	213-643-2142
UCLA	213-825-1742
USC	213-743-2670

Navy/Marine ROTC

Through arrangements with the Professor of Naval Science at the University of California at Los Angeles, NROTC courses will be made available to qualified California State Polytechnic University, Pomona students through enrollment in the UCLA Extension University. These courses, in conjunction with a baccalaureate degree and other NROTC training requirements, will lead to a commission in the United States Navy or Marine Corps. CSUN will grant appropriate academic credit applicable toward graduation for Naval Science courses accredited by the University of California and offered through the UCLA Extension University. Uniforms, Naval Science textbooks, and a monetary stipend for juniors and seniors will be provided by the NROTC Unit UCLA. Students are also eligible for NROTC scholarships which are awarded on a competitive basis. Interested students should contact the following for additional information:

Naval Science Department
University of California Los Angeles
405 Hilgard Avenue
Los Angeles, CA 90024
Phone (213) 825-9075

International Programs

Now in its 26th year of continuous operation, 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. Since its inception, International Programs has enrolled nearly 9,500 CSU students.

A wide variety of academic majors may be accommodated by the 34 foreign universities cooperating with the International Programs in 16 countries around the globe. The affiliated institutions are: the University of Queensland (Australia), the University of Sao Paulo (Brazil); the universities of the Province of Quebec (Canada); the University of Copenhagen (through DIS Study Program); the University of Provence (France); the Universities of Heidelberg and Tübingen (Germany); the Hebrew University of Jerusalem (Israel); the University of Florence (Italy); Waseda University (Japan); the Iberoamericana 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); the University of Uppsala (Sweden); Bradford, Bristol, Sheffield, and Swansea Universities and

Kingston Polytechnic (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 Coordinator on campus.

To be selected to participate, students must have upper division or graduate standing at a CSU campus by the time of departure, possess a cumulative grade point average of at least 2.75 or 3.00, depending on the program, for all college level work completed at the time of application, and have completed required language or other preparatory 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 selection committee.

The International Programs pay 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 the campus International Programs Office located in the Campus Center Building (97) or by writing to The California State University International Programs, 400 Golden Shore, Long Beach, CA 90802-4275. Applications for the 1991–92 academic year overseas must be submitted by February 1, 1991.

National Student Exchange (N.S.E.)

Cal Poly Pomona belongs to the National Student Exchange consortium, which comprises 90 state universities and colleges in 41 states. The program provides the opportunity for eligible students to complete part of their degree coursework in a challenging new environment at one of the participating institutions. Involvement in unique courses or special programs not available at the home institution is a common reason for participating, but the desire to travel or expand personal experience is also an acceptable motive. Prior to the student's departure, careful course planning is completed in conjunction with the student's academic advisor, to insure that coursework completed while on exchange will be acceptable toward the student's Cal Poly degree objective. Although there are modest fees for application and placement, the student usually pays only the regular Cal Poly registration fees during the exchange period. Travel and living costs must also be considered. Students receiving financial aid are welcome to participate.

Basic eligibility at the time of application requires: 1) the student has at least a 2.50 grade point average; 2) the student is enrolled for at least 12 units; 3) the student is usually a sophomore or junior at time of exchange. There is an application fee.

The National Student Exchange program is administered through the Office of the Associate Vice President, Student Support Programs, 1–106. Applications are available in January, and placement is completed by the end of March for the next academic year.

University Equity Programs

As part of the university's efforts to expand educational opportunity to student populations which traditionally have not been fully represented in the university, a number of programs have been developed. These are seen as university wide and include cooperative efforts between the Offices of the Vice President for Academic Affairs and the Vice President for Student Affairs. For further information on the programs listed below please contact the University Equity Officer, Suzanne Burger, Associate Vice President for Student Support Programs (714-869-3356).

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 potential for success who come from a low-income disadvantaged background and who may not possess the high school grade point average *or* the college entrance examination scores necessary 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 assisted by an assistant counseling coordinator are available for personal as well as academic advisement. A full-time coordinator of the Instructional Support Center assisted by a tutorial specialist and two language and learning skills specialists are available to provide instructional assistance in any subject area, including study strategies. There are upper division student peer-counselors, major advisors, and tutors who work directly with each new EOP student under the supervision of the coordinators of counseling and instructional support services. The academic program includes several one-day summer orientations for new students. 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 for success 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.

Under the direction and coordination of the administrative unit of the Educational Opportunity Program, the university offers the Summer Bridge Program. The Summer Bridge Program is a systemwide project offered at all twenty campuses designed to improve the retention and graduation rates of underrepresented students. The purpose of the program is to enhance and assist underrepresented students in preparing for the academic demands of the university. The program participants are required to be admitted to the university for Fall Quarter. Participants begin as summer dorm residents, while participating in a two-phase program offering orientation and advising, university-level courses, workshops, and recreational activities.

The program includes a five-week session for newly-entering freshmen and a three-week session for newly-entering community college transfer students. The orientation-advising phase of the program is designed to acquaint students with university procedures and facilities, and revolves around the CPU 101, Orientation course. Summer Bridge also offers recreational and cultural enrichment programs, and workshops for the students' parents. The second phase, academic instruction, is composed of several areas of instruction including study skills, cultural awareness through speech and critical thinking, math, and English/reading. Students in the freshman program receive six units of credit for the Summer Quarter.

The Minority Engineering Program

The objective of the Minority Engineering Program (MEP) is to increase the number of underrepresented minorities in engineering and computer science. Through MEP's efforts, participating students receive intensive tutorial support and extensive academic advising. A special orientation course helps the MEP student make the transition to the university environment and to Cal Poly. Professional engineers and computer scientists serve as role models while providing practical information about career opportunities in their areas of specialty.

The MEP Study Center provides room for students to study in groups and to secure tutorial assistance. It is a friendly place where students can talk with each other and with MEP staff, and where information is posted about academic deadlines, MEP activities, summer job opportunities, scholarships, and field trips.

The program thus strives for the retention and graduation of its members. Applicants must be residents of California and be U.S. citizens or Permanent Residents.

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 ensure 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 one or more quarters 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 coursework 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 Career Center (Building 97, room 100). For additional information on programs available within colleges, contact the designated cooperative education college coordinator, or the Coordinator, Student Employment and Cooperative Education, Ms. Sandra Gutierrez, or Dr. J. Ernest Simpson, Director of Cooperative Education (Building 3, Room 233).

THE DESIGNATED SUBJECTS CREDENTIAL PROGRAM IN BUSINESS AND MARKETING EDUCATION

The Designated Subjects Credential Program in Business and Marketing Education represents a statewide effort to provide current teaching methodology, materials, and strat-

egies to persons entering the teaching profession based on expertise acquired through work experience. Special emphasis in the program is given to the use of computers for business applications and as a teaching tool. In order to make the program accessible to potential candidates in the far corners of the state, the instructional format includes alternative methods of instruction. Information about enrollment into the program may be obtained by calling the Business Education Center (714) 869-2388 or Dr. A. Schatz, (714) 869-2389.

Persons with five years of recent work experience may qualify for a program leading to a credential to teach at the secondary or community college levels in business and marketing subject matter areas.

Secondary Schools

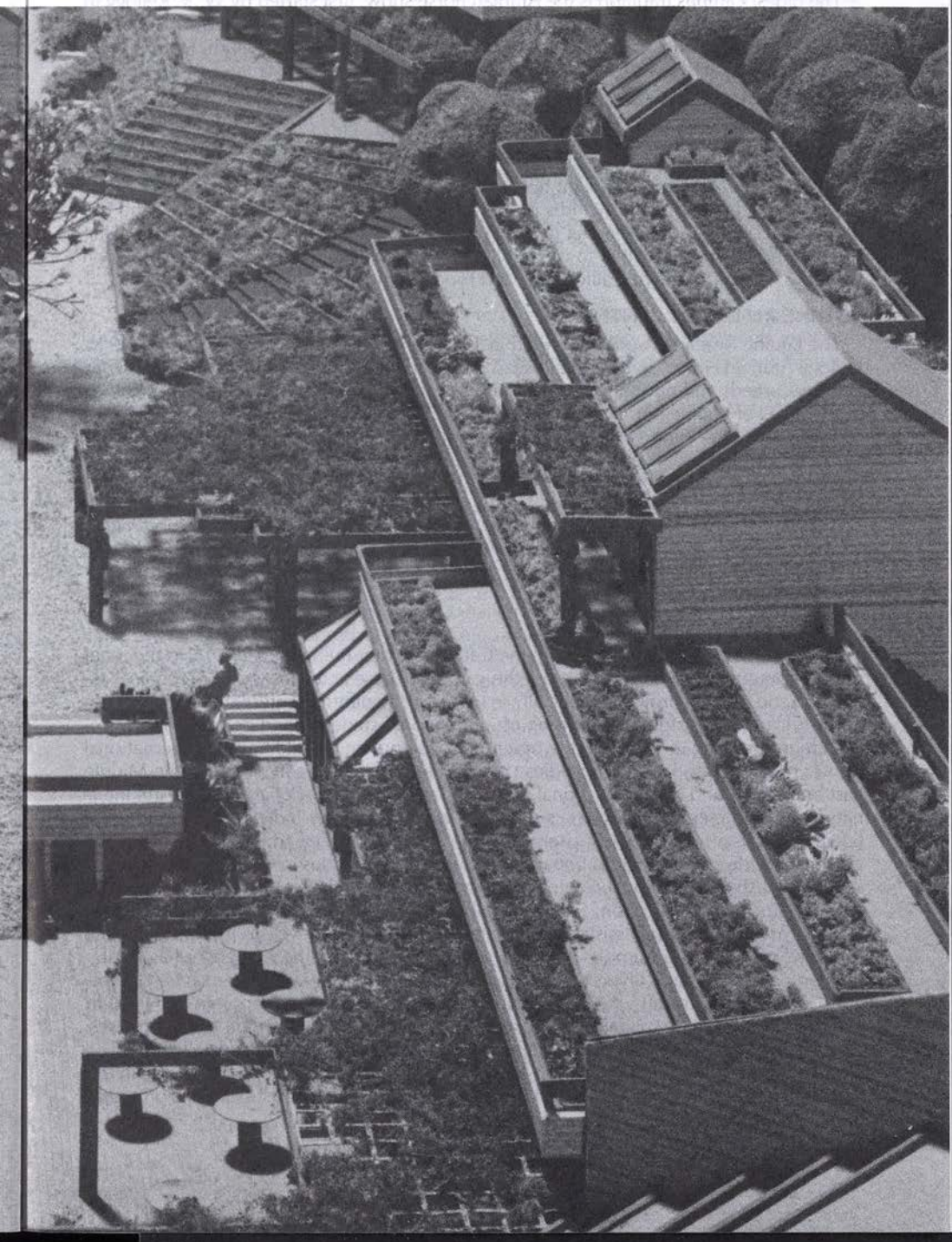
With five years of verified work experience in the subject areas to be taught, a person may obtain a one-year Preliminary Designated Subjects Credential to teach in business and/or marketing programs. Within that one year, the candidate is expected to satisfy the U.S. Constitution requirement for all teachers. When this requirement has been satisfied, the candidate may apply for a five-year Preliminary Designated Subjects Credential.

The five-year period is necessary so that the new teacher has sufficient time to satisfy requirements leading to the Clear Credential; namely, two years of satisfactory classroom teaching experience and completion of 9 semester (the equivalent to 14 quarter) units or 135 clock hours of personalized preparation. At Cal Poly, this includes completion of MHR 409, EDU 408, MHR 400, EDU 444, and MHR 499. When offered off campus, credit is earned through Continuing Education at Cal Poly. A final requirement is the completion of one semester (two quarter) units of an approved health education course focusing on drug and alcohol abuse. Both the U. S. Constitution and drug/alcohol abuse requirements can be satisfied through courses offered at Cal Poly.

Community Colleges

Courses offered in the Designated Subjects Credential Program in Business and Marketing Education may be applied toward the full-time Instructor's Credential at the community college.

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 on the first Sunday in October through June 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 out 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.

INTERNATIONAL CENTER

Dr. Gary A. Cretser, Acting Director
Dr. Daniel Raffalovich, Lead Instructor
Cal Poly Language Institute
Mr. John Berne, International Student Advisor
Dr. Joseph P. Beaton, Campus Coordinator
CSU International Progams
Ms. Marisela Cordero, Administrative Secretary

The International Center, located in the Campus Center Building (Bldg. 97) is the focal point for international activities across the campus. These activities include technical assistance and training projects, especially in third world countries, international exchanges of both faculty and students, advising of international students, and coordination of research and training in the area of women in development. In addition the International Center provides liaison to area studies committees for China, Latin America, the Middle East and Africa and the International Business Task Force, the College of the Arts International Committee, and numerous other campus groups and individuals. The International Center staff also works closely with the various colleges and departments in the university-wide effort to internationalize the curriculum. Various student services are also available at the International Center including advising for international students, international student identification, Eurail/Britrail passes and passport information.

In the area of technical assistance, the International Center develops proposals for and manages projects in a number of world regions. In the past the university has implemented projects in such diverse nations as the Yemen Arab Republic, Tanzania, Greece, and Costa Rica. Currently the Center is involved in ongoing development activities in Cameroon, Senegal, Chad and Lesotho and in the training of government- sponsored students from around the world in both regular degree programs and specially designed workshops. The Center is actively involved in the placement of Cal Poly students in the CSU International Programs in sixteen different countries and in other exchange programs in Norway and France. -

Several of the training programs mentioned above have been done in conjuction with other organizations such as the National Association of Schools of Public Affairs and Administration (NASPAA), the Agency for International Development, the Department of Education and a variety of government and private organizations and consulting firms. Cal Poly is a member of the Consortium for International Development (CID) which besides Cal Poly includes ten other universities.

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 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 multidisciplinary 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. For information regarding Cal Poly's participation in the Consortium please contact the Associate Vice President for Academic Programs (Building 1-221).

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 California state universities including Cal Poly Pomona. The Desert Studies 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 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 approaches 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 basin, 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 the Study Center, 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 desert educational activities are welcome to use the Center facilities. For information on Cal Poly's participation in the Desert Studies Center, contact the Associate Vice President for Academic Affairs (Building 1-223).

LEARNING RESOURCES CENTER
Dr. Frank Torres, Director

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. Special GWT workshops and tutorials are also provided by the Center.

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. For further information contact Dr. Frank Torres.

CENTER FOR NORMATIVE STUDIES
Dr. James Manley, Director

The Center for Normative Studies houses a variety of activities including the Campus Forum, lecture series. This Tuesday series of lectures has provided a focus for campus discussion since its inception over a decade ago. Other activities include the Campus Forum Retreats, Occasional Lectures at the University House, and special institutes.

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 from Dr. Manley at (714) 869-3573 or 869-3570.

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, a recipient of a Title XII collaborative research support program grant, 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.

INSTITUTE FOR CELLULAR AND MOLECULAR BIOLOGY
Dr. Jill 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 multidisciplinary 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 Adler.

INSTITUTE FOR ADVANCED SYSTEMS STUDIES (I.A.S.)

This Institute sponsors educational and research programs in the new field of the Systems Sciences. This transdisciplinary field unifies the new sciences of complexity with advanced approaches to systems from many specialties.

The Institute is staffed by 30 to 50 Faculty and Associate Fellows selected for their outstanding accomplishments in their home departments combined with their demonstrated ability for and interest in crossing disciplinary lines. The Fellows offer a 32-unit Minor in Comparative Systems Analysis (see description in this catalogue at the end of the College of Science entries) and a Certificate in Comparative Systems Analysis through the Office of Continuing Education. Also offered are interdisciplinary courses for on-campus credit as well as arranged workshops for regional business, industry, health, and government organizations.

The Fellows of the Institute conduct both basic and applied research on both natural and social systems. Students are organized into research Task Forces under the supervision of one or more Fellows and can receive credit from their home department (at the 200 and 400 level) for working on Institute projects. This encourages and accomplishes significant cross-fertilization across the Colleges and departments. Examples of ongoing projects in the domain of basic systems research include: (1) computer analysis of natural hierarchical levels using clustering analysis; (2) systems allometry across physical, biological, and sociological systems; (3) systems analysis of symmetry and duality across the natural sciences; (4) linkage propositions between sixty systems isomorphies; (5) design and testing of cooperation equations in ecology and economics. Examples of ongoing projects in the domain of applied systems research include: (1) fractal analysis of solid tumors for cancer diagnostics and prognosis; (2) ecohouse research for optimized interaction and cooperation among the sub-systems of American homes; (3) design of a knowledge-based computer system on general systems theory for education and design. Another function of the Institute is to attract funding to our University. Its Fellows have received grants from a diverse set of courses including the National Science Foundation, the U.S. Office of Education, the Chancellor's Office, the U.S. Dept. of Housing and Urban Development, and various Foundations.

Students interested in earning a Minor in Comparative Systems Analysis must declare their interest and intended start and completion dates by obtaining a form from Dr. Len Troncale, Bldg. 3, Room 106 of the Biological Sciences Dept., Phone: (714) 869-4040.

CENTER FOR SCIENCE AND MATH EDUCATION

Dr., Judith E. Jacobs, Director

The Center for Science and Math Education has been established in the College of Science to try to meet the needs of K-12 teachers in the local school districts. The Center provides courses, workshops, and a resource center providing information to districts and teachers about innovative programs, teaching techniques, writing of grant proposals and opportunities for professional development. For further information please contact the Dean of the College of Science.

CENTER FOR BUSINESS EDUCATION

The purpose of the Center for Business Education is to improve the quality of business education in the secondary schools, adult schools, and regional occupational programs and centers in Southern California. This includes recruitment of candidates for the university's teacher preparation program, retraining of existing business teachers, research, and curriculum development. A major objective is to conduct in-service workshops for business teachers to provide them with opportunities to acquire new skills, especially those related to the new technologies impacting office and marketing occupations. Professional development activities also emphasize curriculum design and instructional strategies.

The Center currently provides programming to two audiences: advanced high school students and employed workers in high technology industries. Throughout the school year, Cal Poly Pomona broadcasts undergraduate courses for advanced students in high schools in the greater Los Angeles area. These same courses are also transmitted by satellite to more distant high schools in the High Sierras and the Imperial Valley. In the late afternoon and evenings graduate computer science and engineering courses are broadcast to seven aerospace firms in Southern California.

For information about distance learning at Cal Poly, contact the program director (Building 66-104).

LANDLAB—A Center for Education and Research in the Sustainable Use of Resources

Dr. Edwin A. Barnes III, Acting Director

In 1985, Cal Poly Pomona signed an historic agreement which established the Spadra Landfill and Resource Conservation Project, a joint project between The California State University, the County Sanitation Districts of Los Angeles County, and The County of Los Angeles. Combined with adjacent lands, this agreement authorized the creation of a 339-acre landfill and land resource laboratory (LandLab) adjoining the Cal Poly campus.

Most of the LandLab site is being shaped by the 197 acre Spadra sanitary landfill which was established in 1957 to serve the disposal needs of the Pomona and San Gabriel valleys. The Spadra landfill currently operates as a class III landfill (according to the State of California classification system) accepting only nonhazardous solid and liquid wastes. Under the terms of the agreement, this active sanitary landfill provides unique opportunities and funding for the university to conduct research on landfill, refuse recycling, and refuse to energy processes and their effects on the environment. The university receives more than $200,000 annually for research and master plan implementation activities and will continue to receive these funds as long as the landfill is operational.

The initial phase of the project is being established on 129 acres of land that is available now. This land includes completed fill areas and peripheral lands not involved in the landfill process.

Planning and implementation of the Spadra Landfill and Resource Conservation Project are being carried out jointly. The Districts will continue managing the landfill operation until it is filled. As each portion of the landfill is completed, the Districts will finish grade it, prepare the soil as necessary, and assist in planting the finished surface according to an

agreed upon planting plan. The Districts will also install an irrigation system and provide reclaimed water for landscape irrigation before turning the land over to the university.

The university was charged with developing the master plan—a design for long-term landform and land use and for phasing and implementation of the project. A Joint Advisory Committee has been established to coordinate research, instruction, laboratory, facilities, and other activities relating to land, water, gas, energy, environment and other areas of interest in the university's program and the District's operations.

As an active laboratory for experimenting with and demonstrating ways of using and sustaining resources, LandLab will ultimately support a diverse range of activities designed to serve the educational, research, and leisure needs of the university and the community.

Among the public areas envisioned in the master plan (completed in 1987) are an Information Research Center, an Institute for Regenerative Studies, a California Indian Community Demonstration, experimental structures, recreational facilities, and botanical gardens.

Other Programs

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



ACADEMIC REGULATIONS AND PROGRAMS



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 master's 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:

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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. Graduate credit is not allowed.

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.

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 (GPA of 2.0) for all units in the major (core courses and designated option courses);
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 PLS 201 or AMC 201 and HST 202 or AMC 202.
4) spent not less than three quarters in residence, two of these quarters immediately preceding graduation;
5) earned not fewer 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 e.g. GPA of 2.0) in all courses taken at Cal Poly and overall coursework;
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) met the Graduation Writing requirement.
9) had a graduation check. An appointment for this records check shall be made in the Evaluations Office no more than three quarters before expected date of graduation;
10) filed an application for graduation in the Evaluations Office prior to the deadline listed in the academic calendar.

Determination of Graduation Requirements

In determining graduation requirements for first time freshmen, students have three 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, or they may decide to use the requirements listed in the university catalog at the time of their graduation, or they may elect to use the requirements in effect at the time they begin study at a CSU campus or a California community college.

Whenever a student changes major, while this action is not considered a break in enrollment status, he/she will come under either the major department degree graduation requirements published in the Cal Poly university catalog at the time the major was changed or under the provisions of the catalog applicable to the period in which he/she wishes to graduate.

California community college students transferring to Cal Poly without a break in enrollment status will be evaluated on the graduation requirements listed in the Cal Poly university catalog at the time of entry into the California community college. Students may elect in writing to the Evaluations Office to fulfill graduation requirements in effect at Cal Poly upon entrance or to fulfill graduation requirements in effect at the university at the time of graduation. After entry to Cal Poly, any change of status or major will cause them to come under the major degree catalog provisions valid at the time of the change. (GE will not change.)

Students who are not in attendance for two quarters in any given calendar year are considered to have broken enrollment status. This will affect both major and other degree requirements and may require additional course work for degree completion.

Requirement in Mathematics Proficiency

All students must demonstrate a base level math competency. This may be done by taking an approved course in mathematics or statistics. The following courses have been judged to meet this requirement: MAT 105, MAT 106, MAT 114, MAT 115, MAT 116, MAT 125, MAT 130, MAT 131, MAT 135, or STA 120, STA 220 or MAT 205 and 206 (Liberal Studies—Ryan only). Transfer students will satisfy this requirement by taking an equivalent course which may also be used to meet the CSU General Education quantative reasoning requirement. Intermediate Algebra taken at a Community College will not meet this requirement, nor will it be considered acceptable to meet the quantitative reasoning requirement.

Graduation Requirement in Writing Proficiency

All students must demonstrate competency in writing skills as a requirement for graduation. See the catalog section on the Graduation Writing Test (GWT) Requirement, or the Test Center, Building 1, Room 101, for additional information.

ENTRY-LEVEL MATHEMATICS (ELM) Requirement *

Entry Level Mathematics (ELM) Test—All undergraduate students admitted for fall 1983 and thereafter and who are subject to the 1983–84 or later campus catalog or bulletin must take the test and *pass it* before enrolling in a course that satisfies the college-level mathematics requirement of the General Education-Breadth program. Exemptions from the test are given only to those students who can present proof of one of the following:

- a score of 3 or above on the College Board Advanced Placement Mathematics examination (AB or BC)
- a score of 530 or above on the Mathematics section of the Scholastic Aptitude Test (SAT-Math)
- a score of 23 or above on the ACT Mathematics Test
- a score of 520 or above on the College Board Math Achievement Test, Level 1
- a score of 540 or above on the College Board Math Achievement Test, Level 2
- completion of a college course that satisfies the General Education-Breadth Requirement in Quantitative Reasoning at the CSU campus to which they have transferred. The course must be at the level of college algebra or above with a grade of C or better.

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 Code of Regulations* and CSU Executive Order 393.

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 or they may be obtained from the Office of Admissions and Records.

* Since both the EPT/ELM 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 101)

ENGLISH PLACEMENT TEST (EPT) Requirement *

All entering students must complete the CSU English Placement Test (EPT) with the exception of students who present one of the following:

1. Students who receive "exempt" 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 470 or above on the Verbal section of the College Board Scholastic Aptitude Test (SAT-Verbal).
5. A score of 22 or above on the ACT English Usage Test (or 25 after October 1989).
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 Code of Regulations,* 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 on their fee bill and must register and take the next scheduled exam. 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. The materials may also be obtained from the Office of Admissions and Records. Further information regarding the examination and possible exemptions may be obtained from the Office of Academic Testing, Bldg. 1, Room 101.

GRADUATION WRITING TEST (GWT) Requirement *

All students subject to degree requirements listed in the 1977–78 and later 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 a written 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 110 units (for undergraduates) or by the completion of 8 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.

Students who as undergraduates may have had the GWT requirement waived (or who did not need to take it because of continuous enrollment) will need to take it *and pass it* if they return to Cal Poly as graduate students.

Important information about specific exemptions from the test, and the appeals process for the test are contained in GWT Study Guide and Information Bulletin, which are available to all students. They may be obtained from the Office of Academic Testing, Bldg. 1, Room 101.

* Since both the EPT/ELM 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 101)

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 Code of Regulations*, 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 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 Academic Programs (Building 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 Academic Programs (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 college dean
   c. The student's major department chairperson
   d. The student's major college dean
   e. The student
   f. The Associate Vice President for Student Affairs
- The student has three university academic days from the date of exclusion during which a formal protest may be lodged with the instructor's college dean concerning the instructor's decision. If the student desires to make such a protest, the college dean and department 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.

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 any purpose including that of raising the Grade Point Average (GPA).

Students may not enroll in courses which have prerequisites without having successfully completed such prerequisites with the appropriate passing grade as designated by the offering department. If passing grade is designated as "C" or better, "C" is defined as 2.0 on a 4 point grading scale.

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 by his/her major department for any one of the following reasons:
   a. When the overall cumulative GPA is 7 or more grade points below a 2.0 at the end of any quarter; or
   b. When the Cal Poly cumulative GPA is 7 or more grade points below a 2.0 at the end of any quarter; or
   c. When the major (core) cumulative GPA is 7 or more grade points below a 2.0 at the end of any quarter; or
   d. When more than one-third of a student's total units in any 12-month period do not satisfy his/her degree requirements.

The determination of the GPA in the major and proportion of courses taken to satisfy degree requirements is the responsibility of the major department.

5. Students on probation *will* be automatically disqualified at the end of fall and spring quarters if:
   a. a freshman or sophomore (less than 90 quarter units of university work completed) is 22.5 or more grade points below a 2.0 (C average).
   b. a junior (90 to 134 quarter units of university work completed) is 13.5 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 who are Subject to Scholastic Disqualification will have holds placed on their Permits to Register the following quarter. Such students can obtain release of their permits and proceed to register only after they have filed, with the major department, a copy of an Advising Contract signed by their department chair certifying that they have been properly counseled as to how to regain good standing and have been advised of the consequences of failure to do so. The department chair must sign the student's Permit to Register.
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 quarter has elapsed. Students are disqualified from the university twice a year. Students disqualified at the end of fall quarter will not be eligible to return to school the

following spring. Students disqualified at the end of spring quarter will not be eligible to register the following fall 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 petition for Academic 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.

9. Administrative-Academic Probation: An undergraduate or graduate student may be placed on administrative-academic probation by action of appropriate campus officials for any of the following reasons:
   a. Withdrawal from all or a substantial portion of a program of studies in two successive terms or in any three terms. (Note: A student whose withdrawal is directly associated with a chronic or recurring disability or its treatment is not to be subject to Administrative-Academic probation for such withdrawal.)
   b. Repeated failure to progress toward the stated degree objective or other program objective, including that resulting from assignment of 15 units of NCr, when such failure appears to be due to circumstances within the control of the student.
   c. Failure to comply, after due notice, with an academic requirement or regulation which is routine for all students or a defined group of students (examples: failure to complete English Placement Test, failure to complete a required practicum, failure to complete a specified number of units as a condition for receiving student financial aid).

   When such action is taken, the student shall be notified in writing and shall be provided with the conditions for removal from probation and the circumstances which would lead to disqualification, should probation not be removed.
10. Administrative-Academic Disqualification: A student who has been placed on administrative-academic probation may be disqualified from further attendance if:
    a. The conditions for removal of administrative-academic probation are not met within the period specified.
    b. The student becomes subject to academic probation while on administrative-academic probation.
    c. The student becomes subject to administrative-academic probation for the same or similar reason for which he has been placed on administrative-academic probation previously, although not currently in such status.

    When such action is taken, the student shall receive written notification including an explanation of the basis for the action.

NOTE: In order to graduate a student must have an overall GPA of 2.0 in all university coursework as well as a 2.0 in his or her major coursework (e.g. core coursework). If an undergraduate student, at the time of the graduation check, has less than a 2.0 GPA in the major (core), the student can raise the major GPA to a minimum of 2.0 only by the following courses of action:

a. Attainment of sufficient grades in all remaining major (core) courses in the student's program;
b. Attainment of sufficient grades in all remaining major (core) course in the student's program plus the use of the Repeated Course Policy which allows the repetition of no more than 16 units. (Refer to "Repetition of Courses" section in this catalog.)

Regardless of purpose, a student may not repeat a course in the major (core) in which he or she has been assigned more than a C grade (2.0).

A student may not substitute a support course or any other course as a major (core) course after the major (core) course has been taken. Further, this university has the right to prescribe that any particular Graduation requirement be met within seven (7) years. For further details on this prescription please see the Associate Vice President for Academic Programs (Bldg. 1—Room 221).



Academic Policies

MAJOR (CORE) COURSES

1. A student must obtain a 2.0 or greater GPA in the major (core) in order to graduate. If an undergraduate student, at the time of the graduation check, has less than a 2.0 GPA in the major (core), the student can raise the major GPA to a minimum of 2.0 only by the following courses of action:
   a. Attainment of sufficient grades in all remaining major (core) courses in the student's program;
   b. Attainment of sufficient grades in all remaining major (core) courses in the student's program plus the repetition of up to 16 units of major (core) courses. The repetition of courses in the major (core) follows the same policy for all courses and is stated in the *Catalog* under REPETITION OF COURSES.
2. Regardless of purpose, a student may not repeat a course in the major (core) in which he or she has been assigned more than a C grade.
3. A student may not substitute a support course or any other course as a major (core) course after the major (core) course has been taken.

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 college sections showing degrees, options and minors offered by each college. The procedures to be followed in order to elect a minor are available in departmental or college 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. Minors are available 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 baccalaureate degree as well 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 curricula are met at the same time.

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. Students should be aware that the curriculum for the second major will be the one in effect when they add the second major.

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.

A maximum of 70 semester units (105 quarter units) of community college course credit may be applied toward the bachelor's degree. No credit may be allowed for professional courses in education taken in a community college.

A maximum of 36 quarter units of extension course credit may be applied toward the bachelor's degree. Students taking more than *36 college level transferable* quarter units through *Cal Poly Pomona or other* Continuing Education *or Extended Education programs* or Open University *coursework* may satisfy a specific course requirement, but only 36 units may be considered by the university as transferable college level work which meets the minimum number of quarter units required for a degree.

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 may 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 (See also graduate section)

Grades have the following functions:

1. To recognize performance in a particular course.
2. To act as a basis of screening for other courses, programs or graduate school.
3. To inform the student of his/her level of achievement in a particular course.
4. To stimulate the student to learn.
5. To inform prospective employers of the student's achievements.

The following grading system is in effect for undergraduates:

A Superior Work
indicates originality and independent work and a thorough mastery of the subject matter/skill; achievement so outstanding that it is normally attained only by students doing truly exemplary work.

B Very Good Work
indicates clearly better than adequate competence in the subject matter/skill; achievement of quality higher than adequate, but not of exemplary quality.

C Adequate Work
indicatates that classroom work, outside assignments, and examinations have been completed at a level indicating adequate competence in the subject matter/skill.

D Minimally Acceptable Work
indicates achievement which meets the minimum requirements of the course, but at a level indicating less than adequate competence in the subject matter/skill.

F Unacceptable Work
indicates achievement that fails to meet the minimum requirements of the course and is clearly below university quality; not a passing grade.

I Incomplete (units attempted charged after a maximum of 1 year)
SP Satisfactory Progress (Units attempted charged after 1 year)
W Official Withdrawal (Units attempted not charged)
AU Audit (no credit)
U Unofficial Withdrawal (Units attempted charged)

At the discretion of the instructor, plus and minum (+/—) grading symbols may also be granted. The grade points associated with each grade are as follows:

A	= 4.0	C+	= 2.3	F	= 0
A−	= 3.7	C	= 2.0	I	= 0
B+	= 3.3	C−	= 1.7	SP	= 0
B	= 3.0	D+	= 1.3	W	= 0
B−	= 2.7	D	= 1.0	AU	= 0
		D−	= 0.7	U	= 0

An Audit grade (AU) signifies that a student has audited a course through an approved process (See Registrar). 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. A failing grade is not an acceptable reason to request or grant an incomplete 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 coursework. 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 college dean on a general academic Petition. For master's degree thesis or projects (695, 696), the time limit is two years. The SP symbol is authorized for such courses numbered as 461, 462, 690–698, and English 095, 096, 097, 098 and 099. The SP grade is not used in calculating the grade point average.

The "W" symbol indicates that the student was permitted to drop the course after the 5th 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 by the end of the seventh week of instruction will receive the "W" in all coursework if they file an approved petition in the records office. After the seventh week of instruction, course instructors may assign letter grades (A-F) or the "W" for coursework 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. Instructors cannot grant the grade of U. This is done administratively when a student withdraws from a course without authorization (e.g. no approved withdrawal form is on file in the Records Office). If a student stops attending class and the instructor does not feel there are adequate completed assignments or course activities upon which to base a letter grade (A-F), the instructor shall assign a W on the final grade report. If the appropriate withdrawal form is not on file, this W will become a U in the Records Office and a U will appear on the final grade sheet returned to the instructor and on the student's grade report.

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 catalog 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 Records 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 Associate Vice President for Academic Programs (Bldg. 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 courses in student's major (core) will be given letter grades only.

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. **Courses designated for CR/NC grading will be shown in the catalog with the bold faced dagger symbol (†).** 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, including all transfer work, 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 "C—," "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 "B—," "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 (but not 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.

Students should consult their advisor about the advisability or possibility of repeating a course.

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 three 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.
3. Application for Academic Renewal is made during the quarter in which the applicant plans to graduate.

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 Associate Vice President for Academic Programs (Bldg. 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 representative 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. Qualification for graduation in terms of Grade Point Average (GPA) is 2.0 in major and 2.00 overall GPA.

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 University" 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 and that the grades received were not earned (e.g. letter grades A-F).

A student who wishes to apply for retroactive withdrawal must do so within one calendar year of the last day of the quarter in which he/she unofficially withdrew from the University. A student does not have to be enrolled at the University at the time the application for retroactive withdrawal is submitted.

Petitions are available from the Office of Academic Programs (1-221).

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 2.75 or better; some departments may specify a higher GPA.
3. the petition is submitted before the end of the third week of the quarter in which the work is performed; retroactive credit will not be granted;
4. the petition is endorsed by the course instructor, and approved by the Office of Academic Programs.
5. Applies only to 300, 400, and 500 level coursework.

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 evaluated according to standards established by the graduate college. Further grades earned will be considered in the cumulative graduate GPA.

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 2.75 or better.
2. The petition is submitted prior to the end of the third week of the quarter in which the work is performed. Retroactive credit will not be granted.
3. The petition is endorsed by the student's instructor and advisor, and approved by the Office of Academic Programs.
4. Applies only to 500 level coursework.

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 Board. Students who present scores of three or better will be granted a

maximum of six semester units (nine quarter units) of college credit. (Scores of four or better for Biology, English, and Physics). For specific information on Advanced Placement credit contact the Office of Academic Programs (1-221) or the campus Evaluations Office (1-100).

CREDIT BY EXAMINATION *

California State Polytechnic University grants credit to those students who pass examinations that have been approved for credit systemwide. These include the Advanced Placement Examinations, 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	elective only	4
CLEP College Algebra-Trigonometry	49	Math 105 or Math 106, but not both	4
CLEP Calculus and Analytic Geometry	48	Math 125	4
CLEP Statistics (with essay)	49	STA 120	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 receive "Pass for Credit" on 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.

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

Only enrolled undergraduate students may challenge courses by taking examinations developed at the campus. Credit shall be awarded to those who pass them successfully. A student may not challenge more than 36 quarter units worth of coursework.

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.

* Subject to change. Contact Office of Academic Programs for further information (714-869-3330). See also section on grading symbols.

A $5.00 fee per unit is charged for each challenge examination ($25 maximum). 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. Courses challenged in a student's major are only awarded letter grades.

CREDIT FOR NONCOLLEGIATE INSTRUCTION

California State Polytechnic University grants undergraduate degree credit for successful completion of noncollegiate instruction, either military or civilian, appropriate to the baccalaureate, that has been recommended by the Commission on Educational Credit and Credentials of the American Council on Education. The number of units allowed is that recommended in the *Guide to the Evaluation of Educational Experience in the Armed Services* and the *National Guide to Educational Credit for Training Programs.*

SERVICE MEMBERS OPPORTUNITY COLLEGES

California State Polytechnic University has been designated as an institutional member of Servicemembers Opportunity Colleges (SOC), a group of over 400 colleges and universities providing voluntary postsecondary education to members of the military throughout the world. As a SOC member, California State Polytechnic University recognizes the unique nature of the military lifestyle and has committed itself to easing the transfer of relevant course credits, providing flexible academic residency requirements, and crediting learning from appropriate military training and experiences. SOC has been developed jointly by educational representatives of each of the Armed Services, the Office of the Secretary of Defense and a consortium of thirteen leading national higher education associations; it is sponsored by the American Association of State Colleges and Universities (AASCU) and the American Association of Community and Junior Colleges (AACJC).

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 at least one year of active military service.

An additional 13½ quarter units of elective credit will be allowed toward graduation to any student submitting evidence of receiving 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.

CREDIT FOR CONTINUING EDUCATION COURSEWORK

Students taking more than *36 college level transferable* quarter units through *Cal Poly Pomona or other* Continuing Education *or Extended Education programs* or Open University *coursework* may satisfy a specific course requirement, but only 36 units may be considered by the University as transferable college level work which meets the minimum number of quarter units required for a degree.

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 3.5 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 3.5 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—3.65–3.79; cum laude—3.50–3.64.

Students who complete their graduation requirements in the summer, fall or winter quarters will have their GPA's determined before the graduation program is printed and their designated honors will be identified in the program.

Students who complete their graduation requirements in the spring quarter will not have their final GPA's determined until after program printing and possibly until after graduation. In order to identify these students in the program, their GPA as of the last winter quarter should be used as the determining GPA for graduation honors recognition. If the student's GPA status (as to Graduation Honors) changes for spring quarter graduates as a result of grades earned during the spring quarter, this will be recorded on their transcripts and on their diplomas. This status change will not occur in the graduation program. The number of status changes is expected to be minimal.

Only students who have completed all of their graduation requirements before spring quarter or students who are registered for the balance of their graduation requirements in the spring quarter (as of the census day) will be eligible for honors at graduation.

Graduation Honors should be printed next to the student's name in the graduation program and announced at the college convocations. This policy will become effective with the June 1994 graduation.

UNIVERSITYWIDE HONORARY SOCIETIES

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.

Golden Key National Honor Society

The Golden Key National Honor Society is a non-profit organization which was founded by undergraduate students in 1977 at Georgia State University to recognize and encourage scholastic achievement and excellence among upper division students in all undergraduate fields of study. It is through the recognition of scholastic achievement, the presentation of scholarships to outstanding members, and the involvement of members in educational programs that the society promotes excellence in academics.

Phi Beta Delta

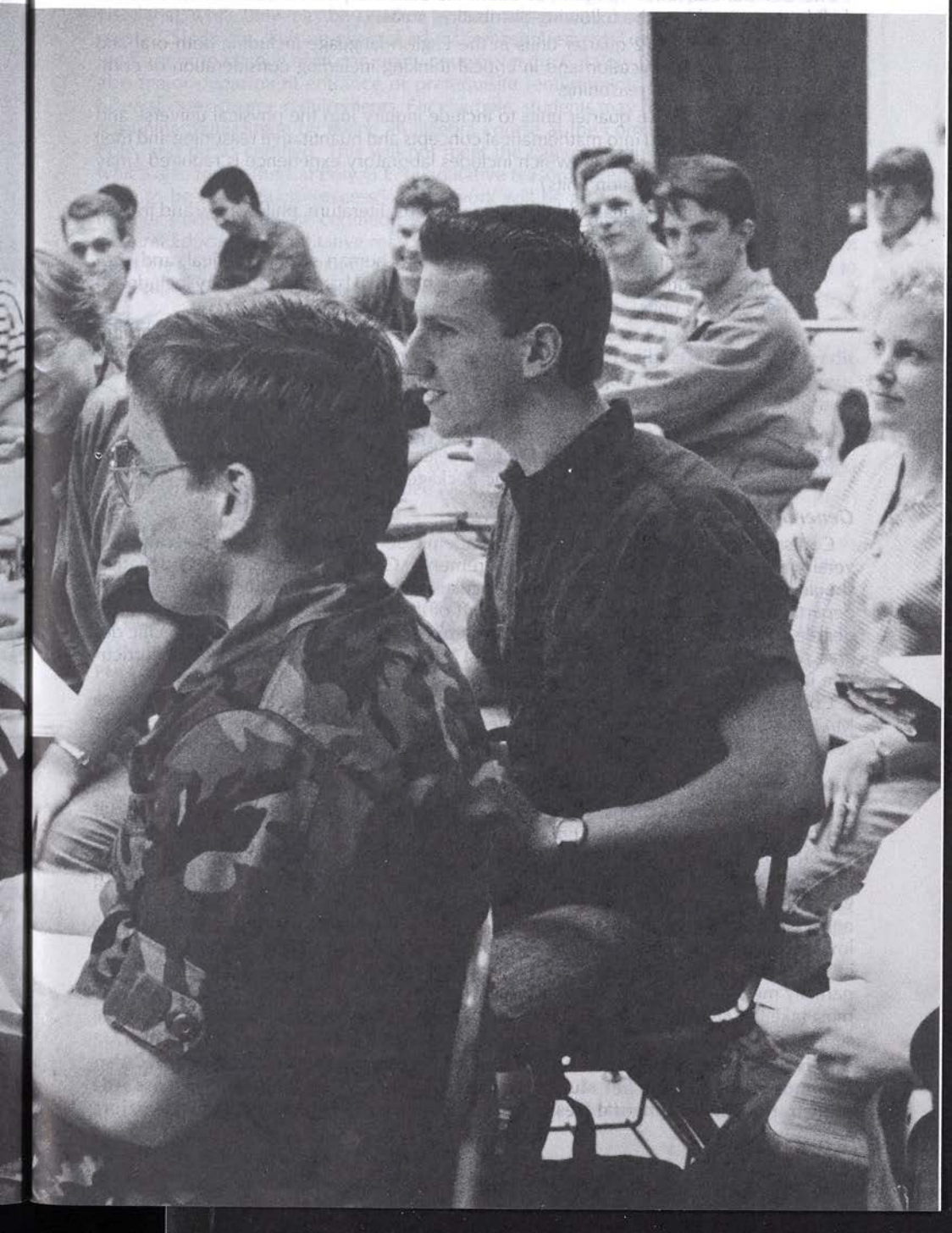
Phi Beta Delta is an honor society formed to recognize and encourage professional, intellectual, and personal achievements in international education. The Cal Poly chapter was founded in 1986 and at present primarily consists of students who have spent a year of study abroad in one of the forty California State University overseas study programs in sixteen different countries. Other students and also faculty and administrators may be invited to become members. The society fosters community and dialogue within an international perspective.

Phi Kappa Phi

Phi Kappa Phi is a national academic honor society for all academic disciplines. The Cal Poly chapter was chartered in 1973 to recognize outstanding juniors, seniors, and graduate students. The national organization offers graduate fellowships, and the Cal Poly chapter offers two scholarships annually for students of junior standing.



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 selected from a campus Academic Senate approved upper-division academic packages.

General Education—Approved Coursework

Courses are approved by the Campus Academic Senate by category to meet the university general education program requirements. Coursework in general education should not be taken without a specific curricular goal. Students should consult with their departmental degree advisors or with the staff of the University Advising Centers. 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.

Interdisciplinary General Education (IGE)

Students majoring in degree programs outside of the College of Arts should also consult the coursework list for the INTERDISCIPLINARY GENERAL EDUCATION PROGRAM (IGE). This program is designed for students in professional and Math based degree programs (Engineering, Science, Business, Agriculture, Environmental Design, etc.) and provides an integrative-thematic approach to the Humanities and Social Sciences components of General Education (categories I, III, IV, V, and VI) for a total 32 units of the 48 lower-division units required. This program is designed as a 2 and one-half year program in which the participant studies both major coursework as well as courses designed to partially meet the University General Education requirement. Applicants for this program must take the EPT (score of 147 or better) or have this test waived because of other test scores (e.g., SAT, ACT, etc).

This is the preferred pattern for most students in engineering and architecture. Also recommended to all other students in the Colleges of Agriculture, Business Administration, Environmental Design, and Science. Not presently available to majors

in the College of Arts except the Humanities Major in the English and Foreign Languages Department. See departmental advisors or Program Director.

Transfer and Change of Major Students and General Education Certification

Community college transfer students and Cal Poly change of major students are advised that, while they may be certified by their community colleges as having met all (or most) CSU lower division general education requirements, or have met G.E. requirements prior to change of major, many courses on the Cal Poly General Education list are also major department entrance or prerequisite requirements and will still have to be taken to meet degree requirements. For example, students may have met the quantitative reasoning requirement by taking an algebra course at the community college, or at Cal Poly, and be so certified. This will not meet the calculus requirement for engineering, which also meets the Cal Poly G.E. quantitative reasoning requirement. Calculus will still have to be taken. Such "excess" coursework will be given as "elective credit." Some transfer students may be certified by their community colleges as having met the CSU General Education quantitative reasoning requirement with coursework which does not meet the Cal Poly Mathematics proficiency requirement. Such students will also have to take coursework to meet this graduation requirement.

General Education—Course Lists

Note: The Symbol (†) indicates that a course may be taken on a credit/no credit basis. Please refer to corresponding major section in this catalog for prerequisites and detailed description of general education courses listed below.

CATEGORY I—Communication in the English Language (12 units)

Students may select either Pattern 1 or Pattern 2 to meet this category unless specified by their major degree department. See also the IGE program description.

Pattern 1: General

ENG 104 Freshman English I (4)

All speakers of English as a second language who have not achieved the minimum EPT score for ENG 104 must take ENG 102 and 103 in place of ENG 104.

COM 100 Public Speaking (4)

PHL 202 Logic and Semantics (4)

Pattern 2: Writing Emphasis

ENG 104 Freshman English I (4)

All speakers of English as a second language who have not achieved the minimum EPT score for ENG 104 must take ENG 102 and 103 in place of ENG 104.

SA 290 Communication and Aesthetics (4)

G.E. credit granted to College of Engineering students only.

COM 204 Advocacy and Argument (4)

and one of the following:

ENG 105 Freshman English II (4)

ENG 108 Writing About Literature (4)

G.E. credit granted to English majors only.

COM 216 Report Writing (4)

CATEGORY II—Science and Mathematics (16 units)

Students are required to take at least one course from each area. A minimum of 16 units must be completed and at least *one* laboratory course *must be* included. The laboratory requirement cannot be met by recitation sections. These requirements may also be partially fulfilled by a course from an upper division package (Category VII). Laboratory classes are marked with an asterisk (*). Students *must* take the Entry Level Mathematics Test (ELM) and the Math Diagnostic Test for placement purposes prior to enrolling in any MATH or STATISTICS course.

Area A. Mathematics

All students must pass the ELM or equivalent in order to enroll. Math Diagnostic Test also required.

MAT 105 College Algebra (4)

MAT 106 Trigonometry (4)

MAT 114 Analytic Geometry and Calculus I (4)

MAT 115 Analytic Geometry and Calculus II (4)

MAT 116 Analytic Geometry and Calculus III (4)

MAT 125 Introductory Calculus for Business (4)

MAT 130 Technical Calculus (4)

MAT 135 Discrete Mathematics with Applications (4)
MAT 207 Concepts of Elementary Mathematics (4)
STA 120 Introduction to Statistics (4)

Area B: The Physical Sciences

CHM 101 Consumer Chemistry (4)
CHM 103 Fundamentals of Chemistry (4)
CHM 104 College Chemistry (3)
CHM 111 General Chemistry (3)
CHM 141* College Chemistry Laboratory (1)
CHM 151* General Chemistry Laboratory (1)
GEO 101 Physical Geography (4)
† GSC 101 Fundamentals of Earth Science (4)
† GSC 111 Principles of Geology (3)
GSC 112 Historical Geology (3)
† GSC 115 Astronomy of the Solar System (3)
† GSC 116 Astronomy of the Universe (4)
† GSC 117* Astronomy Laboratory (1)
† GSC 141* Principles of Geology Laboratory (1)
GSC 142 Principles of Geology Field Trip (1)
GSC 151* Historical Geology Laboratory (1)
† PHY 102 Fundamentals of Physics (4)
PHY 105 Physics of Musical Sound (4)
PHY 121 College Physics (3)
PHY 131 General Physics (3)
PHY 141* College Physics Laboratory (1)
PHY 151* General Physics Laboratory (1)

* These courses satisfy the Category II laboratory requirement.

Area C: The Life Sciences

† AS 111 Animal Agricultural Science (4)
BIO 110 Life Science (3)
BIO 111* Life Science Laboratory (1)
BIO 115* Basic Biology (5)

* These courses satisfy the Category II laboratory requirement.

Area D. Science, Technology and Civilization

AGB 100 Insects & Civilization (3)
† AGR 111 Plants & Civilization (4)
† BIO 201 Environmental Conservation (3)
BIO 213 Principles of Evolution (4)
BIO 220 Introduction to Marine Biology (4)
EGR 201 Search for Solutions (4)
† GSC 250 Environmental Geology (4)
MIC 100 World of Microbes (4)

For Liberal Studies Major: 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. See departmental advisor for more specific information.

Area A.

MAT 205 Basic Concepts of Elementary Mathematics (4)
MAT 206 Concepts of Elementary Mathematics (4)

Area B.

BIO 110 Life Science (3) FWSpSu

Area C.

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

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. See also the Interdisciplinary General Education Program (IGE) Section, which is the recommended pattern for most students in Engineering and Architecture.

Area A. Fine and Performing Arts

ART 110 The Visual Arts (4)
ART 212 History of Western Art (Part I) (4)
ART 213 History of Western Art (Part II) (4)
ART 214 History of Western Art (Part III) (4)
DAN 202 Introduction to Dance (4)
DR 203 Introduction to the Theater (4)
DR 210 Introduction to the American Theater (4)
ENV 112 Meaning of Architecture (4)
MU 100 Introduction to Music (4)
MU 101 Music Appreciation (4)
MU 103 World of Music (4)
PA 214 History of Garden Art (4)
SA 290 Communication and Aesthetics (4)

G.E. credit granted to College of Engineering students only.

Area B: Philosophy and History

HST 101 History of Civilization: The Ancient World (4)
HST 102 History of Civilization: The Middle Period (4)
PHL 201 Introduction to Philosophy (4)
PHL 203 Introduction to the History of Philosophy (4)
PHL 204 Ethics (4)
PHL 205 Business and Professional Ethics (4)
PHL 210 World Religions: Oriental (4)
PHL 211 World Religions: Mediterranean World (4)
REC 124 Philosophy of Leisure and the Work Ethic (4)

Area C: Literature and Foreign Languages

ENG 201 Introduction to Modern Fiction (4)
ENG 202 Introduction to Poetry or Modern Drama (4)
ENG 203 Introduction to Shakespeare (4)
ENG 204 Modern Fiction for Speakers of English as a Second Language (4)
ENG 205 Black Literature in America (4)
ENG 206 Introduction to Contemporary Literature (4)
ENG 207 Survey of British Literature I (4)
ENG 208 Survey of British Literature II (4)
ENG 211 Survey of American Literature I (4)
ENG 212 Survey of American Literature II (4)
ENG 215 Latino Literature in America (4)
ENG 216 The Bible as Literature (4)
ENG 217 World Literature I (4)
ENG 218 World Literature II (4)
ENG 222 The Literature of Science Fiction (4)
ENG 231 Introduction to Folklore (4)
FL 101 Elementary French I (4)
FL 102 Elementary French II (4)
FL 103 Elementary French III (4)
FL 111 Elementary German I (4)
FL 112 Elementary German II (4)
FL 113 Elementary German III (4)
FL 114 Conversational German for Beginners (4)
FL 121 Elementary Ancient Greek I (4)
FL 122 Elementary Ancient Greek II (4)
FL 123 Elementary Ancient Greek III (4)
FL 131 Elementary Latin I (4)
FL 132 Elementary Latin II (4)
FL 133 Elementary Latin III (4)
FL 141 Elementary Russian I (4)
FL 142 Elementary Russian II (4)
FL 143 Elementary Russian III (4)
FL 151 Elementary Spanish I (4)
FL 152 Elementary Spanish II (4)
FL 153 Elementary Spanish III (4)
FL 201 Intermediate French (4)
FL 202 Intermediate French Reading (4)
FL 203 Intermediate French Composition and Conversation (4)
FL 211 Intermediate German (4)
FL 212 Intermediate German Reading (4)
FL 213 Intermediate German Composition and Conversation (4)
FL 251 Intermediate Spanish (4)
FL 252 Intermediate Spanish Reading (4)
FL 253 Intermediate Spanish Conversation (4)
FL 254 Intermediate Spanish Composition (4)

CATEGORY IV—Social, Political, and Economic Institutions and Their Historical Background

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. See also the Interdisciplinary General Education Program (IGE) Section, which is the recommended pattern for most students in engineering and architecture.

Area A. Economic Institutions

EC 201 Principles of Economics (4)
EC 202 Principles of Economics (4)
IA 101 Global Resources for Food (4)
HE 245 Consumerism: The Movement, Its Impact and Issues (4)
MKT 201 The Consumer, Marketing and Society (4)
OM 103 Business and Its Environment (4)

Area B. Social Institutions

ANT 102 Introduction to Cultural Anthropology (4)
EWS 140 Introduction to Ethnic Studies (4)
EWS 145 Introduction to the Study of Women and Men in Society (4)
EWS 201 Afroamerican Experience (4)
EWS 202 Chicano/Hispanic Experience (4)
EWS 203 American Indian Experience (4)
EWS 204 Asian American Experience (4)
GEO 102 Cultural Geography (4)
HE 138 Culture, People and Dress (4)
REC 125 Leisure in Society (4)
† SOC 201 Principles of Sociology (4)
SOC 206 Family Relations (4)
SSC 101 Introduction to Social Sciences (4)
SW 201 Introduction to Social Welfare (4)

Area C: Political and Historical Institutions

ENV 113 Cities, Citizens and Urban Planning (4)
† HST 103 History of Civilization: The Modern World (4)
† HST 201 United States History (4)
PLS 202 Comparative Political Systems (4)
PLS/SOC 290 Political Sociology (4)

CATEGORY V—The Integrated Being (4 units)

Students must select one course from the list below to meet this category. See also the Interdisciplinary General Education Program (IGE) section.

ANT 201 Human Nature/Human Affairs: A Biocultural View (4)
BIO 205 Biological Perspectives on Contemporary Life (4)
CPU 202 Health, Nutrition and the Integrated Being (4)
† PSY 201 General Psychology (4)
PSY 210 Mind, Brain & Behavior: An Integrated View (4)

CATEGORY VI—U.S. History, Constitution, and American Ideals (8 units)

Students must select one course from each group to meet this category. See also the Interdisciplinary General Education Program (IGE) section, which is the recommended pattern for most students in engineering and architecture.

Group 1

AMC 201 American Civilization (4)
PLS 201 Introduction to American Government (4)

Group 2

AMC 202 American Civilization (4)
HST 202 United States History (4)

Note: In each upper division course package when lower division units are replaced in Areas II, or III, or IV by a course in the package, the Area is designated.

CATEGORY VII—Upper Division General Education

Where courses for Categories II, III, or IV are not specified, students should file a petition for substitution. If more than one area or subcategory is given, students may decide which one they wish to use. These Category VII packages are not designated by college or major unless specifically stated otherwise.

Africa and Africans: Past and Present

Select three:

ANT 399 Cultural Areas of the World: Africa (4) (IV-b)
GEO 358 Geography of Africa (4)
† HST 331 Pre-Colonial Africa (4)
† HST 333' African Nationalism and Decolonization (4)

Agricultural Policy in Developed and Developing Nations

ABM 313 Agricultural Policy (4)
IA 362 Agricultural Policy in Developing Nations (4)
PLS 342 Political Development (4)

American Popular Culture

AMS 333 Varieties of American Culture (4) (IV-b)
AMS 450 American Dreams, Myths, and Realities (4)
PE 450 Role of Sport in Contemporary Culture (4)

Applied Physics (Not open to Physics majors)

Select three:

PHY 333 Thermal Physics (4)
PHY 340 Energy and the Environment (4)
PHY 344 Applied Optics (4)
PHY 346 Solid State Physics for Engineers (4)

Applied Social Research

BHS 426 BHS Applied Social Psychology/Sociology (4)
PSY 420 Environmental Psychology (4)
SOC 433 Survey Research (4)

Architectural Coherence in an Urban Environment (Available only to Civil Engineering majors)

ARC 451 Theory of Architecture and Urbanism (4)
CE 301 Technological Economics (4)
GSC 321 Geotechnology (4)

Biochemistry/Molecular Biology

BIO 410 Biophysics (4)
BIO 431 Radiation Biology (4)
BIO 435 Cellular Physiology (4)
BIO 450 Concepts of Molecular Biology (4)

Biology and Health

† BIO 302 Biology of Cancer (4) (II-d)
MIC 330 General Epidemiology (4)
ZOO 435 Public Health Entomology (4)

Business

MHR 301 Principles of Management (4) (IV-b)
MHR 318 Organizational Behavior in a Multi-Cultural Environment (4)
MKT 301 Principles of Marketing Management (4)

California Studies

Select three:

ANT 320 Indians of California (4)
GEO 351 'Geography of California (4) (IV-c)
† HST 370 History of California (4)
PLS 328 American State and Local Politics (4)

Child and Adolescent Development

PSY 310 Child Psychology: Early Childhood (4)
PSY 311 Child Psychology: The Middle Years (4)
PSY 312 Adolescent Psychology (4)

Communication for Management

Select three:

MHR 318 Organizational Behavior in a Multi-Cultural Environment (4) (IV-b)
COM 314 Organizational Communication Theory (4)
COM 321 Communications Problem Analysis (4)
COM 337 Group Discussion (4)

Culture and Behavior

ANT 355 Psychological Anthropology (4)
ANT 358 Social Anthropology (4) (IV-b)
COM 327 Intercultural Communication (4)

Development and Human Learning

PSY 312 Adolescent Psychology (4)
PSY 340 Educational Psychology (4)
PSY 334 Cognitive Processes (4)

Economics and Industry

Select three:

EC 433 Economics of Transportation (4) (IV-a)
EC 434 Economics of Public Utilities (4) (IV-a)
EC 440 Business and Government (4) (IV-a)
EC 441 American Industry (4) (IV-a)

Effective Communications

MHR 324 Communication for Management (4)
and two of:
COM 314 Organizational Communication Theory (4)
COM 321 Communications Problem Analysis (4)
COM 413 Public Opinion, Propaganda and the Mass Media (4)

Family Development

PSY 310 Child Psychology: Early Childhood (4) (IV-b)
SOC 321 Family as a Social Institution (4)
SW 314 The Socially and Culturally Different Child (4)

Fiscal, Personnel, and Program Management (Designated for Park Administration majors)

ABM 324 Management Accounting (4)
ABM 402 Personnel Management (4)
REC 330 Recreation in Urban Settings (4) (IV-b)

Food Chemistry and Technology

FN 317 Food Science and Technology (4)
FN 420 Food Chemistry and Toxicology (4)
MIC 320 Food Microbiology (4) (II-d)

Foods and Nutrition

FN 420 Food Chemistry and Toxicology (4)
FN 433 Advanced Nutrition (4)
FN 434 Advanced Nutrition (4)
FN 435 Nutritional Assessment - Biochemical (2)
(To be taken as lab 2 with FN 433)

History of Political Thought

PLS 431 Ancient and Medieval Political Thought (4)
PLS 432 Modern Political Thought (4)
PLS 436 Twentieth-Century Political Thought (4) (IV-c)

History of the Physical Sciences

Select three:

CHM 306 History and Philosophy of Chemistry (4)
† HST 421 The Scientific Revolution (4)
MAT 306 History of Mathematics (4)
PHY 306 History of Physics (4)

Latin American History (Not open to History majors)

† HST 335 Latin America: The Colonial Period (4)
† HST 336 Latin America: The Era of Nation Building (4)
† HST 337 Latin America: Problems of the 20th Century (4)

Love and Human Sexuality

BIO 301 Human Sexuality (4) (II-d)
PHL 465 Philosophy of Love and Sex (4) (III-b)
PSY 455 Human Sexual Behavior: Relationships (4) (IV-b)

Management Entrepreneurship (Designated for Animal Science majors)

ABM 324 Management Accounting (4)
ABM 328 Agricultural Enterprise Management (4) (IV-a)
ABM 402 Personnel Management (4)

Mathematical Techniques for Applications in Science

MAT 317 Laplace Transforms and Fourier Series (3)
MAT 318 Mathematical Analysis of Engineering Problems (3)
STA 330 Applied Probability Theory (4)
STA 331 Applied Statistics (4)

Measurements and Controls (Available only to Mechanical Engineering majors)

CHE 428 Machine and Process Controls (4)
ECE 333 Electronic Instrumentation and Control (4)
ME 435 Advanced Engineering Measurements (4)

Mental Disorders

PSY 415 Abnormal Psychology (4)
PSY 430 Psychobiology of Mental Disorders (4) (IV-b)
SOC 430 Sociology of Mental Disorders (4)

Modern European History

† HST 323 Enlightment, Absolutism, and Constitutionalism 1648–1789 (4)
† HST 324 Revolution and Reaction 1789–1850 (4)
† HST 325 Nationalism, Imperialism, and Industrialization 1850–1914 (4)
† HST 326 Europe in the 20th Century (4)

Organizational Behavior in a Multicultural Environment

MHR 318 Organizational Behavior in a Multi-Cultural Environment (4) (IV-b)
MHR 438 Advanced Organizational Behavior (4)
MHR 452 Emerging Issues in Management (4)

Philosophy of Science

BIO 436 History and Philosophy of Biology (4)
CHM 306 History and Philosophy of Chemistry (4)
PHL 459 Epistemology (4)
SCI 450 Philosophic Implications of Science (4)

Physical Chemistry and Chemical Engineering Kinetics

CHE 311 Momentum Transport (4)
CHE 312 Energy Transport (4)
CHE 313 Mass Transport (4)
CHM 304 Elements of Physical Chemistry (4)

Politics and Peoples of Developing Nations

ANT 399 Cultural Areas of the World: Africa (4) (IV-b)
ANT 399 Cultural Areas of the World: Mesoamerica (4) (IV-b)
PLS 342 Political Development (4) (IV-c)

Preprofessional

BIO 303 Genetics (4)
ZOO 414 Embryology (5)
ZOO 422 Histology (5)
ZOO 424 Comparative Animal Physiology (5)

Remote Sensing

GSC 370 Planetary Geology (4) (IV-a)
and two of:
GEO 310 Earth from Space (4)
GEO 410 Photographic Remote Sensing (4) (IV-a)
GEO 420 Digital Image Processing (4) (IV-a)

Resource and Land Economics

Select three:

EC 419 Seminar in Land Economics (4)
EC 431 Regional Economic Analysis (4)
EC 432 Seminar in Urban Economics (4)
EC 435 Seminar in Environmental Economics (4)

Sex Roles in America

BHS 328 Women and Men: Changing Sex Roles (4) (IV-b)
EWS 380 Women in Contemporary Society (4)
MHR 406 Changing Managerial Sex Roles (4)

Social Problems

SOC 301 Contemporary Social Problems (4) (IV-b)
SOC 302 Criminology (4)
SOC 360 Juvenile Delinquency (4)

Social Responsibilities of the Engineer

CPU 401 Ethics and Engineering Decision-making (4)
EGR 401 Products Liability and Patents (4)
IE 401 Engineering Economic Decision Analysis (4)

Society and Change

SOC 330 Population and Society (4) (IV-b)
SOC 350 Collective Behavior and Social Movements (4)
SOC 401 Urban Sociology (4)

Special Populations: Physically and Mentally Disabled

REC 321 Interventive Strategies and Special Populations (4)
SW 312 The Developmentally Disabled Population (4) (IV-b)
SW/REC 324 Disabled Populations (4)

Studies of a Blue Planet

GSC 303 Climatology (4) (II-d)
GSC 304 Meterology (4)
GSC 335 Descriptive Physical Oceanography (4)

The Civilization of England in the Pre-Modern Era

† HST 351 England to 1689 (4) (IV-c)
and two of:
ENG 401 Chaucer (4)
ENG 402 Milton and His Contemporaries (4)
ENG 403 Shakespeare (4)

The First Americans: American Indians

ANT 321 Indians of North America (4) (IV-b)
EWS 403 American Indian Contemporary Issues (4)
† HST 403 The American Indians (4)
or
PHL 307 American Indian Thought and Religion (4) (III-b)

The Modern Era

ART 312 Foundations of Modern Art (4) (III-a)
ENG 450 Twentieth-Century British Literature (4) (III-c)
or
ENG 456 Twentieth-Century American Literature (4) (III-c)
† HST 326 Europe in the 20th Century (4) (IV-c)

The Soviet Union

GEO 353 Soviet Union: Environment and People (4) (IV-b)
† HST 356 The Soviet Union (4)
PLS 447 Soviet Government and Politics (4)

Theoretical Compressible Fluid Mechanics

ARO 311 Gas Dynamics (3)
MAT 317 Laplace Transforms and Fourier Series (3)
MAT 318 Mathematical Analysis of Engineering Problems (3)
ME 301 Thermodynamics (4)

Water Resources (Available only to Geology and Earth Science majors)

ABM/IA 350 Agricultural Water Resource Utilization (3)
† BIO 420 Water Pollution Biology (3)
GSC 360 Groundwater Geology (4)
SS 333 Soil and Water Conservation (4)

Women and Society

ANT 405 Women: An Anthropological View (4) (IV-c)
EWS 440 Women's Philosophical and Social Issues (4)
† HST 406 Women in the U.S. (4) (IV-c)

Women in Comparative Perspective

Select three:

ANT 405 Women: An Anthropological View (4) (IV-b)
EWS 390 The Ethnic Woman (4)
† HST 406 Women in the United States (4) (IV-c)
PE 469 History of Women in Sport (4)

INTERDISCIPLINARY GENERAL EDUCATION PROGRAM (IGE).

This is the preferred pattern for most students in engineering and architecture. Also recommended to all other students in the Colleges of Agriculture, Business, Environmental Design, and Science. Not presently available to majors in the College of Arts except the Humanities Major in the English and Foreign Languages Department. See departmental advisors or Program Director.

TOTAL 32 QUARTER UNIT INTERDISCIPLINARY GENERAL EDUCATION PROGRAM: COURSE DESCRIPTIONS

All eight courses of the two and one half year IGE Program share the following common goals:

Learning Outcomes

1. Communication skills and critical thinking.
2. Development of historical social consciousness.
3. Multicultural understanding.

4. Understanding and appreciation of aesthetic experiences.
5. Understanding and articulation of values.
6. Independent integration of knowledge and experience through active student learning.

Please refer to University Programs section in this catalog for IGE course descriptions.

FIRST YEAR

IGE 120 Consciousness and Community: Origins and Development of Human Societies (4)

IGE 121 Rationalism and Revelation: The Ancient World (4)

IGE 122 Authority and Faith: Feudalism and the Renaissance (4)

SECOND YEAR

IGE 220 Culture and Contact: The Expansion of the West (4)

IGE 221 Reform and Revolution: The Age of Enlightenment (4)

IGE 222 Individualism and Collectivism, Competing Ideologies: The Industrial Age (4)

THIRD YEAR

IGE 223 Promise and Crisis: The Modern World (4)

IGE 224 Connections Seminar: Exploration and Personal Expression (4)

HOW INTERDISCIPLINARY G.E. PROGRAM MEETS UNIVERSITY REQUIREMENTS

This 32 unit program meets the following portion of the University General Education requirements. (Engineering students see adviser for specific additional coursework required by major.)

CATEGORY I — **COMMUNICATION IN THE ENGLISH LANGUAGE**

Pattern I or IIA—4 units (first year) Freshman English I (ENG 104) equivalent.
Students select additional coursework from regular G.E. Pattern I or II courses.
Credit received by completion of IGE 120, 121, and 122.

CATEGORY II — **SCIENCE AND MATHEMATICS**

Not included. Select courses from regular G.E. lists as specified by major.

CATEGORY III — **ARTS, LITERATURE, PHILOSOPHY AND FOREIGN LANGUAGES**

A, B, and C: 8 units (first year)
Select additional 4 units course from any of categories.
Students receive credit by completing IGE 120, 121 and 122.

CATEGORY IV — **SOCIAL SCIENCES**

A—4 units—Select from regular G.E. list
B—4 units (second year)
C—4 units (second year)
Students receive credit by completing IGE 220 and 221.

CATEGORY V — **INTEGRATED BEING (Satisfied)**

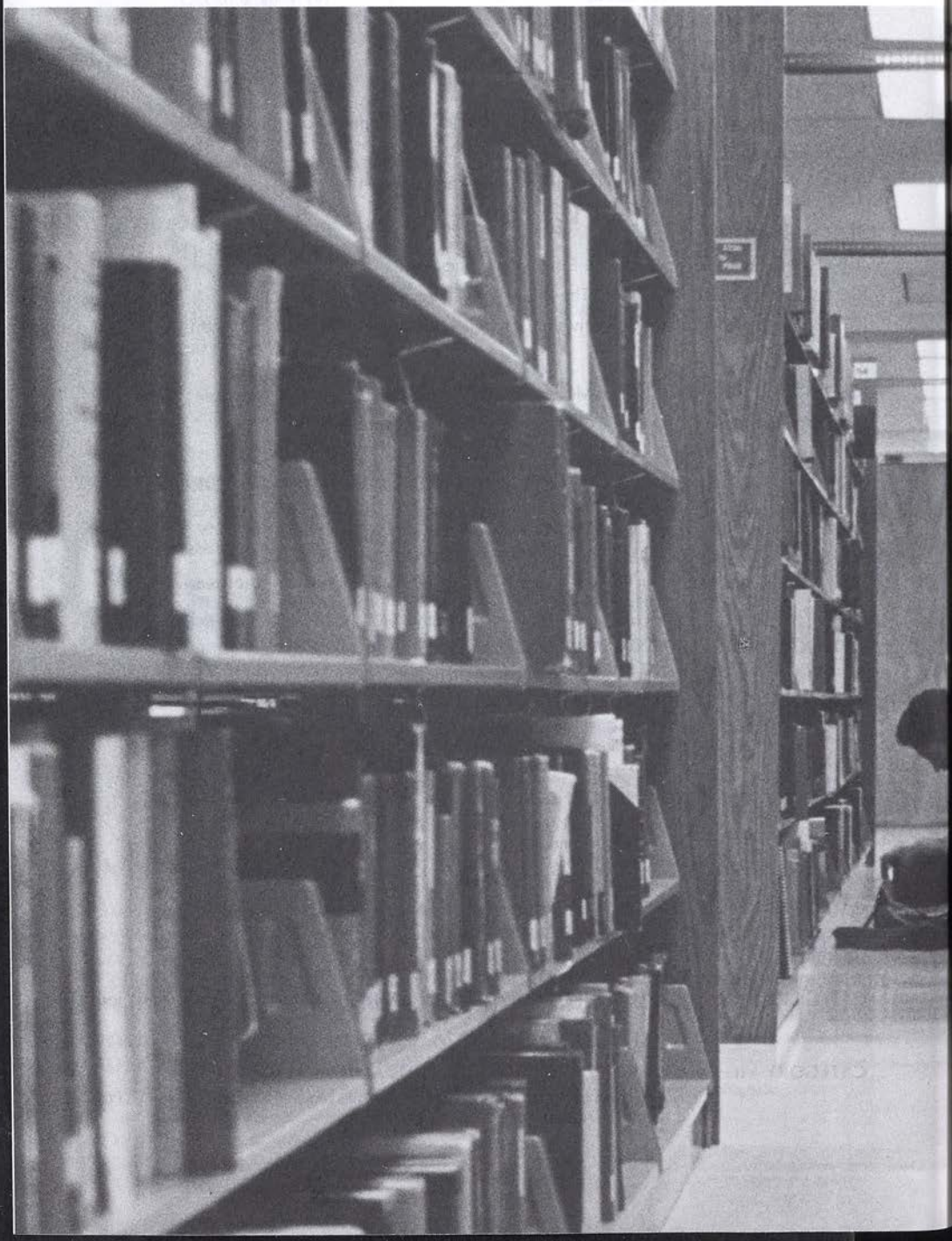
3 units (first year)
1 unit (second year)
Students receive credit by completing IGE 224.

CATEGORY VI — **U.S. HISTORY, CONSTITUTION, AND AMERICAN IDEALS (Satisfied)**

8 units (second year)
Students receive credit by completing IGE 224.

CATEGORY VII — **UPPER DIVISION GENERAL EDUCATION**

Not included in IGE. Courses needed to meet this requirement are listed in the upper-division G.E. section. See advisor for specific coursework required by major.



UNIVERSITY PROGRAMS



UNIVERSITY PROGRAMS

Interdisciplinary General Education (IGE)

Director

James Manley, *Associate Director*

Nancy Ware, *Associate Director*

The **IGE** (INTERDISCIPLINARY GENERAL EDUCATION) Program is a team-taught, thematically integrated sequence of courses that meets many general education requirements in a stimulating intellectual environment. These requirements, which apply to all California State University campuses, help to broaden skills and understanding in areas beyond the major (such as social science, literature, composition). Usually these requirements are fulfilled by taking separate courses.

FIRST YEAR (F,W,Sp)

IGE 120 Consciousness and Community: Origins and Development of Human Societies (4)

Chronology and civilization; origin of consciousness and myths of origin; symbol and ceremony; people and the environment. Prerequisite: EPT score of 147 or better. (F)

IGE 121 Rationalism and Revelation: The Ancient World (4)

Myth and history; tragedy, humanism, justice, and freedom; subject and citizen. Prerequisite: IGE 120. (W)

IGE 122 Authority and Faith: Feudalism and the Renaissance (4)

Forms of social and economic organization; cultural and intellectual renewal; varieties of spatial organization; secular and sacred forms of aesthetic expression. Prerequisite: IGE 121. (Sp)

SECOND YEAR (F,W,Sp)

IGE 220 Culture and Contact: The Expansion of the West (4)

Exploration and ethnocentrism; the nation state and national artistic cultures; the scientific revolution. Prerequisite: IGE 122. (F)

IGE 221 Reform and Revolution: The Age of Enlightenment (4)

Concepts of progress and individual rights in a time of political revolution; changes in social organization; restructuring of philosophical, scientific, and aesthetic thought. Prerequisite: IGE 220. (W)

IGE 222 Individualism and Collectivism, Competing Ideologies: The Industrial Age (4)

The machine and society; romanticism and realism; capitalism and socialism; population movements. Prerequisite: IGE 221. (Sp)

THIRD YEAR (F,W)

IGE 223 Promise and Crisis: The Modern World (4)

Nationalism and internationalism; world wars and nuclear threat; concept of the global village; ecological dilemmas; modernism and post modernism in the arts. Prerequisite: IGE 222. (F)

IGE 224 Connections Seminar: Exploration and Personal Expression (4)

Research and presentation of an interdisciplinary project; synthesis and integration of selected IGE Program themes. Prerequisite: IGE 223. (W)

International Programs

Joseph P. Beaton, *Campus Coordinator for CSU International Programs*

These course designations serve Cal Poly students participating in the CSU International Programs (IP) overseas as vehicles for residence credit for IP coursework.

IPC 198 Foreign Study Topics: (Course Title) (1–6)

Study undertaken in a foreign university under the auspices of The California State University International Programs.

IPC 398 Foreign Study Topics: (Course Title) (1–6)

Study undertaken in a foreign university under the auspices of The California State University International Programs.

IPC 598 Foreign Study Topics: (Course Title) (1–6)

Graduate study undertaken in a foreign university under auspices of The California State University International Programs. Maximum credit 9 units.

NATIONAL STUDENT EXCHANGE

Laraine Turk, *Coordinator*

These course designations serve Cal Poly students participating in the National Student Exchange Consortium at various universities and colleges in the United States as vehicles for Cal Poly residence maintenance.

NSE 198 National Student Exchange Study Topics: (Course Title) (1–15)

Study undertaken at a member campus of the National Student Exchange Consortium.

NSE 398 National Student Exchange Study Topics: (Course Title) (1–15)

Study undertaken at a member campus of the National Student Exchange Consortium.

Library

Harold Schleifer, *Director*

For Library instruction: Call the Library Reference Department at extension 3076.

Military Science

Maj. Michael Flannery, *Officer in Charge, Army ROTC*

The ROTC program offers these courses on the Cal Poly Campus.

MS 101 History of the World Wars (2)

A survey course in the military history of early 20th Century warfare. Managerial revolution in warfare at the turn of the century, 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. 2 lecture-discussions.

MS 102 History of the World Wars (2)

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. 2 lecture-discussions.

MS 103 History of the World Wars (2)

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). 2 lecture-discussions.

MS 179 (PE 179) Army Physical Readiness Training (1)

This course provides the student with an opportunity to develop his/her physical fitness program with the goal of excelling on the Army Physical Readiness Test. It combines morning physical training with weekly leadership formations as part of the overall ROTC program. Enrolled ROTC cadets should take the course each quarter. Course is also listed in HPERD Department as PE 179. P.E. activity. 3 hours per week.

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 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 216 Fundamentals of Map Reading and Land Navigation (3)

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. 3 lecture-discussions.

MS 301 Small Unit Leadership I (2)

A study of leadership utilizing small unit operations as an application tool to prepare students for becoming Army Second Lieutenants. Students develop leadership skills through the study of military leadership principles, and the practical application of tactical doctrine. A familiarizatiion with small unit operations and other military related subjects provide the tools for practical application. Students are taught to analyze problems, develop solutions and execute plans. Leadership theory and principles of planning and management are presented in the classroom and put into practice in practical leadership exercises. Constructive assessment is provided individually to each student on a routine basis. 2 lecture-problem solving.

MS 302 Small Unit Leadership II (2)

A continuation of the study of small unit leadership with the emphasis shifting to the practical application through simulations and case studies. 2 lecture-problem solving.

MS 303 Small Unit Leadership III (2)

A continuation of the study of small unit leadership. Leadership skills learned thus far are refined as cadets receive final preparation for the ROTC Advanced Camp. 2 lecture-problem solving.

MS 401 Military Justice (2)

A study of the military justice system including the history of military law, philosophy and structure of the military justice system, courts-martial and alternative to courts-martial. Additionally, subjects of topical interest related to the U.S. Army and relevant to the preparation of cadets for junior officer leadership positions will be evaluated. 2 lecture-discussions.

MS 402 Military Professional Ethics (2)

A study of ethics built around the Military Professional Ethics Decision Making model. The purpose of the course is to develop an understanding of the professional soldier's responsibilities to the Army and the nation, the understanding of the need for ethical conduct, and a greater awareness and sensitivity to ethical issues. Case studies serve to assist the student in improving his ability to identify, analyze and understand ethical problems and the influencing factors, and ultimately result in improved ethical decision making skills. 2 lecture-problem solving.

MS 418 (REC 418) Outdoor Survival (3)

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. 2 hours activity.

Cal Poly University

The CPU designation means that such courses are offered for the entire university community regardless of major or school. Many CPU courses have been specifically designed to meet the requirements of general education or to assist students in career/academic choices. For further information in CPU coursework please contact the Office of Academic Programs (Bldg 1—Room 221). "

General Education Courses

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. Team taught. 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. Meets G.E. Category V requirement. Team taught. 4 hours, lecture-discussions.

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. Meets G.E. Category V requirement. Team taught. 2 lectures, 1 lecture-discussion, 1 two-hour activity.

CPU 401 Ethics and Engineering Decision-Making (4)

Team-taught. Explores the ethics of engineers: values; ethical theory and practice; moral reasoning; morality in law and codes; professional standards and societies. Case studies. Open to engineering majors, others as space permits. 4 lecture-discussions. Prerequisites: Senior standing, IE 401, and passing score on the GWT.

Academic/Career Guidance Courses

CPU 100 Career and Personal Exploration (4)

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 PLUS). Materials fee required.

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 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 four units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

CPU 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 four units per quarter. Prerequisite: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

Environmental Health Specialist Minor

The minor provides Biological Sciences majors, Agricultural Biology majors, and other majors with courses which prepare students for careers in the California Department of Health Services as Environmental Health Specialists. Increasing awareness of pollution and other health related environmental problems has led to a demand for specialists to enforce and administer laws governing water, food, and air contamination, noise, land use planning, occupational health hazards, and animal vectors of disease. Many job opportunities exist in California for individuals trained as Environmental Health Specialists according to the California Department of Health Services.

The California Health and Safety Code outlines the standards for admission to the state internship program to become a registered specialist. The minimum educational qualifications are possession of a bachelor's degree from an approved institution with a minimum of 45 quarter units of basic science. The basic science requirement would be met by most students in Biological Sciences and in Agriculture. Students interested in more information may contact Dr. Richard Kaae or Dr. Lester Young (Plant and Soil Sciences Dept.), or Dr. John Chan (Biological Sciences Dept.).

Core courses		*Units*
BIO 115	Basic Biology	5
CHM 104	College Chemistry	3
CHM 141	College Chemistry Lab	1
CHM 105	College Chemistry	3
CHM 142	College Chemistry Lab	1
CHM 201	Elements of Organic Chemistry	3
PHY 102	Fundamental of Physics	4
MAT 105	College Algebra	4
STA 120	Elementary Statistics with Applications	4
		28

Required of all students:		
PLS 314	Public Administration	4
AGB 165	Introduction to Arthropods	4
or		
ZOO 426	Introduction to Entomology	4
MIC 201	Basic Microbiology	5
MIC 330	General Epidemiology	4
		17

Select 3 courses from the following:		
MIC 310	Applied Microbiology	5
BIO 420	Water Pollution Biology	3
BIO 431	Radiation Biology	5
CHM 460	Air Pollution Problems	3
ZOO 435	Public Health Entomology	4
		10–14

Select 3 courses from the following:		
AGB 301	Agricultural Laws and Regulations	3
AGB 323	Vertebrate Pest Management	4
AGB 325	Produce Market Quality	4
AGB 342	Urban Pest Management	4
		11–12

Physiology Minor

The Physiology Minor can be taken by students from any department in the University but it is particularly appropriate for students with the following majors: Animal Science (AS), Behavioral Science (BHS), Biology (BIO), Chemistry (CHM), Electrical and Computer Engineering (ECE Biomedical Engineering), Foods and Nutrition (FN), Health Physical Education Recreation and Dance (HPERD), Microbiology (MIC), and Zoology (ZOO). It is intended to assist students interested in physiology to discover and prepare for careers in: medicine; dentistry; veterinary science; high school teaching; graduate study in general or comparative physiology, kinesiology, exercise physiology or physiological psychology, and; allied health professions such as human and animal nutrition, exercise and health counseling, biomedical engineering, and domestic animal reproduction. It will do this by exposing students to the diversity of disciplines and careers available to people with an understanding of physiology. It will also provide them with a broad basic background and then permit them to tailor a program of advanced courses to suit their general interests and career goals. The program is administered by a steering committee composed of the following individuals: S. Bassin (HPERD), D. Clark (ECE), E. Cogger (AS), A. Crocelius, N. Harkey (BHS), D. Hoyt (ZOO), P. Mobley (CHM), and D. Stiffler (ZOO). Students interested in more information should contact Dr. Daniel Stiffler.

Physiology Minor

(Prerequisites listed in parentheses)

Assumed entry level skills: High school chemistry and algebra

Core (all courses)		*Units*
BIO 115	Basic Biology (none)	5
CHM 104	College Chemistry (none)	3
CHM 141	College Chemistry Lab (CHM 104 concurrent)	1
CHM 105	College Chemistry (CHM 104)	3
CHM 142	College Chemistry Lab (CHM 141; CHM 105 concurrent)	1
STA 120	Elementary Statistics with Applications	4
	Total Units	17
Restricted Electives		
Anatomy (select one course)		
ZOO 234	Human Anatomy (BIO 115)	4
ZOO 326	Comparative Vertebrate Anatomy (ZOO 138)	5
VS 350	Anatomy & Physiology of Domestic Animals (BIO 115)	4
	Total Units	4–5
Physiology (select one course)		
ZOO 235	Human Physiology (BIO 115)	4
ZOO 424	Comparative Animal Physiology (ZOO 137, 138)	5
VS 351	Anatomy & Physiology of Domestic Animals (VS 350)	4
	Total Units	4–5
Chemistry		
CHM 201	Elements of Organic Chemistry (or equivalent) (CHM 105)	3
CHM 250	Elements of Organic Chemistry Lab (CHM 105)	1
	Total Units	4
Total Units, Restricted Electives		12–14

Advanced Physiology Courses

One or more courses from each of the following four clusters totalling at least 20 units. Two courses must be from outside the major school.

Physiochemical Principles		
CHM 321	*Elements of Biochemistry (CHM 201, CHM 250)*	*4*
CHM 327	*Biochemistry (CHM 315, CHM 317)*	*4*
CHM 328	*Biochemistry (CHM 327)*	*4*
CHM 329	*Biochemistry (CHM 328)*	*4*
CHM 304	*Elements of Physical Chemistry (MAT 116, CHM 113, PHY 133)*	*4*
CHM 305	*Elements of Physical Chemistry (CHM 304)*	*3*
ME 301	*Thermodynamics (PHY 132)*	*4*
ME 302	*Thermodynamics (ME 301, MAT 215)*	*4*
ME 311	*Fluid Mechanics (ME 215, PHY 132)*	*3*
ME 312	*Fluid Mechanics (ME 301, ME 311)*	*4*
BIO 435	*Cellular Physiology (CHM 201)*	*4*
BIO 535	*Advanced Cell Biology (BIO 435, CHM 327 or consent)*	*4*
PHY 410	*Biophysics (PHY 123 or consent)*	*4*
		3–4

Physiology

ZOO 440	Physiological Ecology (ZOO 424 or consent of instructor)	4
BIO 520	Endocrinology (CHM 327, ZOO 424 and/or consent)	4
BIO 521	Renal Physiology (ZOO 424)	3
PSY 303	Physiological Psychology (BHS 204, 205, PHY 202, 203)	4
AS 412	Mammalian Endocrinology (VS 351)	4
AS 413	Physiology of Lactation (VS 351 and AS 412)	3
AS 414	Reproductive Physiology of Food Animals (VS 351 or ZOO 424)	4
PS 431	Avian Physiology (none)	3
ECE 435	Biomed. Ins. & Meas. (BIO 115, ECE 323 or ECE 333 or consent)	3
ECE 485	Biomed. Ins. & Meas. Lab (ECE 435 concurrent)	1
		3-4

Nutrition

FN 235	Nutrition (CHM 201, CHM 250, ZOO 235)	3
FN 236	Nutrition Lab (FN 235 concurrent)	1
FN 433	Advanced Nutrition (CHM 321, FN 235, ZOO 235)	4
FN 445	Nutritional Assessment-Biochemical (FN 433 concurrent)	2
FN 434	Advanced Nutrition (FN 433)	4
FN 443	Diet Therapy (FN 433, FN 445)	4
FN 444	Diet Therapy (FN 443)	3
AS 402	Animal Nutrition (CHM 321)	4
AS 403	Ruminant Nutrition (CHM 321)	4
FN 533	Advanced Nutrition (FN 434)	3
FN 535	Recent Advances in Nutrient Metabolism (consent)	2
FN 536	Nutrition Through the Life Cycle (FN 433)	3
EGR 588	Biological Control Systems (u.d. course in control sys.)	4
		3–4

Ergonomics

PE 303	Physiology of Exercise (ZOO 235)	4
PE 312	Motor Development (SOC 201, PSY 201)	4
PE 402	Biomechanical Kinesiology (PE 302, PHY 102 or 121)	3
PE 403	Physiology of Exercise II (PE 303)	4
PE 430	Motor Learning & Human Performance (PE 303, 425, or consent)	4
PE 454	Clinical Exercise Testing and Counseling (PE 303)	4
PE 455	Sports Medicine (PE 303)	4
PE 456	Exercise Metabolism and Weight Control (PE 303)	3
PE 580	Motor Learning & Human Development (none)	3
PE 583	Motor Development (PE 312 or PE 430)	3
		3-4
	Total Units—Advanced Courses	20
	Total Units—Minor	49–51

Quantitative Research Minor

The Quantitative Research Minor may be taken by students having any major in the University other than Mathematics. It is particularly appropriate for students having majors in the following areas: Operations Management, Marketing Management, Agricultural Business Management, Animal Science, Behavioral Science, Economics, Political Science, Physical Education, Biological Sciences, Urban and Regional Planning. The minor is intended to prepare students to perform quantitative analyses within their area of interest by providing the working knowledge required in statistics, principles of experimental design, survey and data analysis techniques. This includes learning to understand and use some of the statistical software packages available on computers. Students are expected to complete a project in their major having a significant quantitative component. The project is jointly directed by the Statistics Coordinator and a faculty advisor selected from the student's own department. Through such experience our graduates become more able and prepared to perform quantitative studies in their chosen field of employment. For more information students may contact any of the following reference sources: Dr. Alan Krinik (Statistics Coordinator), Dr. Melinda Burrill (Animal Science), Dr. John Korey (Political Science), Dr. Nancy Harkey (Behavioral Science), Dr. Ralph Miller (Operations Management), Dr. Patricia Hopkins (Marketing Management), Mr. Charles Loggins (Urban and Regional Planning), Dr. David Moriarty (Biological Sciences), Dr. Stephen Bryant (Biological Sciences), Dr. John Shieh (Economics), Dr. Josie Sifft (Physical Education) or Dr. Arthur Parker (Agricultural Business Management).

Quantitative Research Minor

		Units
Core		
STA 120	Elementary Statistics with Applications	4
STA 310	Sampling Survey Methods	4
	Units	8
Intermediate (Choose one sequence)		
OM 314	Managerial Statistics	4
OM 380	Advanced Managerial Statistics	4
ABM 375	Agricultural Data Management	4
OM 380	Advanced Managerial Statistics	4
BHS 307	Statistics for Behavior Sciences	4
BHS 340	Computer Methods in Behavior Science	4
STA 210	Statistical Computing	4
STA 320	Nonparametric Statistics	4
STA 210	Statistical Computing	4
BIO 411	Biometrics	3
URP 331	Planning Research Methods I	6
URP 332	Planning Research Methods II	6
EC 321	Economic Statistics	4
EC 322	Economic Statistics	4
EC 421	Econometrics	4
	Units	8-12
Applied Methods (Choose one course from each group)		
GROUP I		
MKT 408	Marketing Research I	4
FRL 483	Real Estate Market Analysis	4
SOC 433	Survey Research	4
ABM 413	Agricultural Marketing Research Techniques	3
GROUP II		
OM 460	Research Design and Methodology	4
PSY 433	Experimental Psychology: Research, Design and Methodology	4
STA 435	Design of Experiments	4
	Units	7-8
Project		
	Students will do a quantitative research project in their major field of study	4
	Total Units	27-32

ATHLETIC DEPARTMENT

Karen L. Miller, *Director of Athletics*

Mike Tracey, *Associate Athletic Director*

Charles Belk
Dave Bollwinkel
Dee DeRaleigh
Ron Fremont
Gayle Harris-Watkins
Phyllis Hoefler
Bob Holycross
Ky Kugler
Ann Lebedeff
Darlene May
Kevin Patterson
Clara Piersma
Otto Rieger
Glenn Shenker
Carol Spanks
John Scolinos
Paula Tezak
Barbara Thaller
Shirley Topley
Chris Ward
Robert Wagner
Leroy Washington
Brian Wiesner

The Department of Intercollegiate Athletics offers opportunities for men and women in a wide variety of sports, which include baseball, basketball, cross country, soccer, softball, tennis, track and field and volleyball. The University holds membership in local conferences of California Collegiate Athletic Association (CCAA), Division II, as well as membership in National Intercollegiate Athletic Association (NCAA), which provides 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.

COURSE DESCRIPTIONS

PE 181-195 Competitive Athletics

May be taken by those students who qualify and wish to compete on an intercollegiate athletic team.

182 Intercollegiate Baseball

183 Intercollegiate Basketball (Men and Women)

184 Intercollegiate Soccer (Women)

185 Intercollegiate Cross Country (Men)

186 Intercollegiate Soccer (Men)

188 Intercollegiate Softball

190 Intercollegiate Tennis (Men)

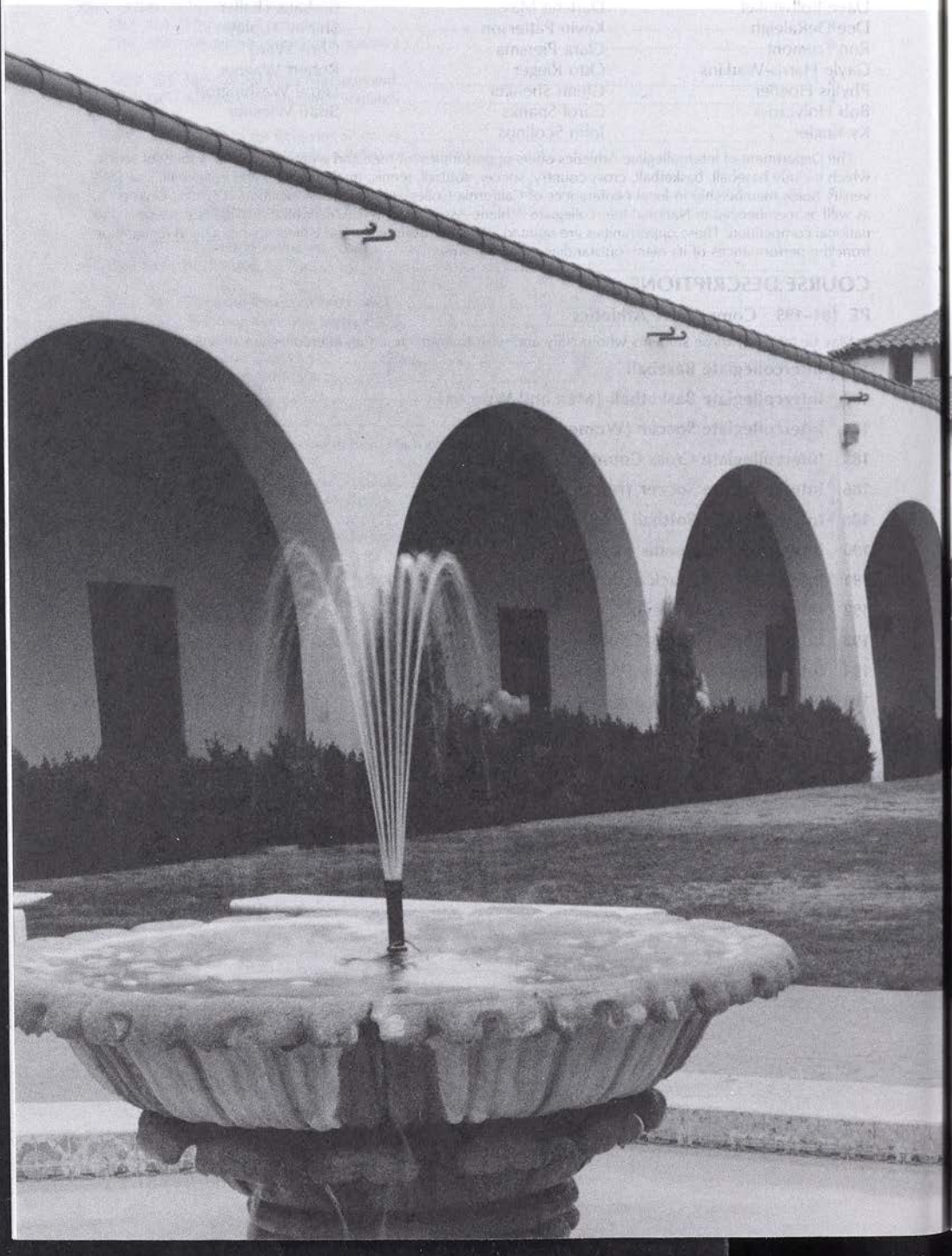
191 Intercollegiate Track and Field (Men)

192 Intercollegiate Volleyball (Women)

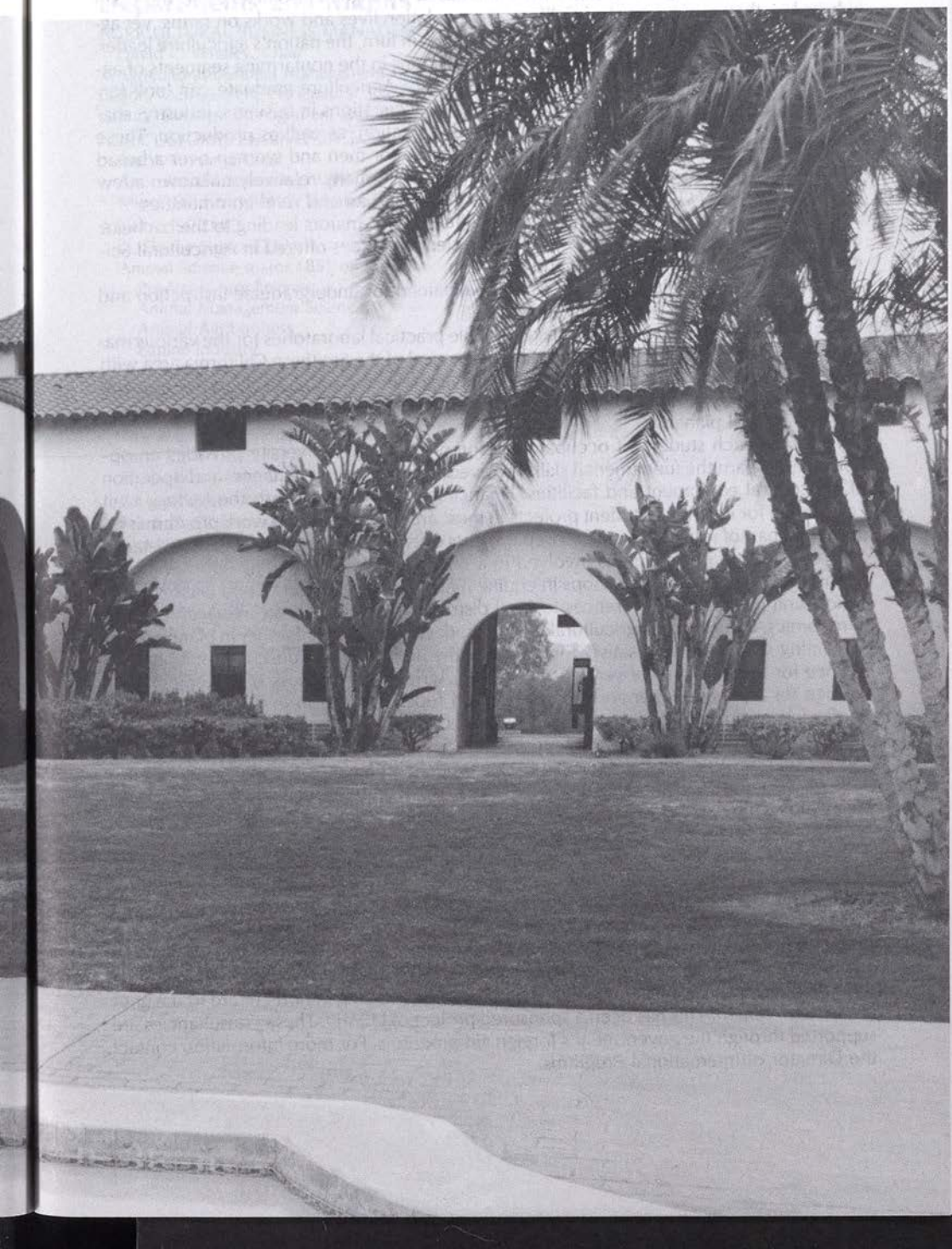
193 Intercollegiate Cross Country (Women)

194 Intercollegiate Tennis (Women)

195 Intercollegiate Track and Field (Women)



COLLEGE OF AGRICULTURE



COLLEGE OF AGRICULTURE

Allen C. Christensen, *Dean*

Peggy S. McLaughlin, *Associate Dean*

Dynamic technological changes have increased management efficiency to the point where less than two 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 College 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 College of Agriculture is offered in 13 majors leading to the bachelor of science degree. There are three Master of Science degrees offered in Agricultural Science, Animal Science, and Foods and Nutrition.

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 College 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 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 College of Agriculture to contributing to the total lifestyle of handicapped persons, special education concerns are incorporated into appropriate courses within the College.

As an adjunct to the academic programs, the College 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. In the past few years the school has been the leading university in providing training in horticulture to the government of Yemen. This has been a sponsored project of USAID. These consultancies are supported through the government's foreign aid programs. For more information contact the Director of International Programs.

Gamma Sigma Delta, an honorary society in agriculture, is open to all students in agriculture. Information concerning requirements for membership can be obtained from the Dean's Office in the College of Agriculture.

Departments and Majors

AGRICULTURAL BUSINESS MANAGEMENT and AGRICULTURAL EDUCATION
David C. Whaley, Chair
Agricultural Business Management major (BS); options in Agricultural Economics, Food Distribution, Management. Agricultural Science major (BS). International Agriculture, major (BS). Agricultural Business Management and International Agriculture minors.

AGRICULTURAL ENGINEERING
Joe Y. T. Hung, Chair
Agricultural Engineering major (BS)
Minor (and certificate) in Landscape Irrigation Design

ANIMAL SCIENCE
G. Duane Sharp, Chair
Animal Science major (BS) options in
Pre-Veterinary Science
Animal Management Science
Animal Agribusiness
Equine Industry

FOODS AND NUTRITION AND HOME ECONOMICS
Bonnita M. Farmer, Chair
Foods and Nutrition major (BS)
Home Economics major (BS)
Early Childhood Education (Certificate)
Home Economics and Costume Technology minors

ORNAMENTAL HORTICULTURE
Frank D. Gibbons, III, Chair
Ornamental Horticulture major (BS)
Park Administration major (BS)
Ornamental Horticulture and Park Administration minors

PLANT AND SOIL SCIENCE
Gaylord P. Patten, Chair
Agricultural Biology major (BS);
Agricultural Biology and Pest Management Minors
Agronomy major (BS)
Options in
Crop Production
Crop Science
Agronomy minor
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

Interdisciplinary General Education (IGE)

Students majoring in the various programs in Agriculture are encouraged to take part of their General Education requirements through the Interdisciplinary General Education Program (IGE). This IGE program is specially designed to meet the needs of Agriculture students particularly in the areas of writing, critical thinking, humanities and the social sciences.

Cooperative Education

The College 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 will 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 College 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.

Gaylord P. Patten, *Chair, Plant and Soil Science Department*

Richard S. Kaae, *Coordinator, Agricultural Biology*

Rex O. Baker Lester C. Young

Agricultural Biology combines the areas of agriculture, technology, 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, vertebrate pests and environmentally hazardous materials.

Professional careers with county, state and federal departments of agriculture, public health services and allied governmental agencies in protecting and promoting agriculture, 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, agricultural production enterprises and public health services, both domestic and international are available. Research, teaching and graduate studies are other interesting pursuits. A new area of emphasis is Environmental Health Sanitarian. Sanitarians play an important role in the administration and regulatory enforcement of environmental health and public health laws. Some of the activities environmental health professionals are involved in include: drinking water sanitation, vector control; prevention of atmospheric pollution; radiological protection; sanitary production of milk, meat and other foods; hazardous and toxic substance control; housing and institutional sanitation; solid and liquid waste management; and sanitation of swimming pools and bathing places. Environmental health professionals are frequently involved in the following: Survey and analyze community water supplies and work the public health laboratory to assure that the water complies with Safe Drinking Water Standards. Design and supervise the installation of sewage disposal systems for homes. Evaluate proposed subdivisions to assure that development will not result in public health hazards. Review legislation regarding environmental health and analyze its impact on society. Conduct educational courses in food and water sanitation, recreational health, toxic substance control and vector control to promote community awareness in these areas.

The marketing of agricultural products presents many opportunities for individuals with a knowledge of quality standards, the environmental factors, and organisms affecting food, fiber and health.

Summer employment, cooperative education placement, and internships are encouraged because they provide both valuable experiences and income for students.

Opportunities are expanding and are abundant for graduates. Increased demand for qualified graduates has resulted because of growing public awareness in environmental, consumer and public health issues. Many governmental agencies are expanding their role in recruiting qualified individuals to staff their needs. 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.

A recent survey of our alumni indicated that careers were plentiful. A recent graduate can expect a starting salary in the $25-$30,000 range and reach $60–70,000 within 10 years.

PEST MANAGEMENT AND AGRICULTURAL BIOLOGY MINORS

The Pest Management minor combines key courses in order to prepare students for the many careers which partially encompass areas of pest control. This minor is ideally suited for those majoring in Agricultural Business Management, Agronomy, Animal Science, Fruit Industries, International Agricultural, Ornamental Horticulture and Park Administration.

The Agricultural Biology minor is especially suited for individuals majoring in Biology or many areas of agriculture and are interested in working in careers with the county, state or federal departments of agriculture dealing with consumer and environmental protection.

ENVIRONMENTAL HEALTH SPECIALIST MINOR

The Environmental Health Specialist Minor is an Interdisciplinary program which may be pursued by majors in any field. Its purpose is to prepare students for careers as Environmental Health Specialists by meeting the standards for the state internship program. State employed specialists enforce and administer laws governing water, food, and air contamination, noise, land use planning, occupational health hazards, and animal vectors of disease. The minor is particularly suitable for students majoring in Biology.

A full description of the minor is in the "University Programs" section of this catalog.

CORE COURSES FOR MAJOR*

Introduction to Agricultural Biology	AGB	101	(1)
Introduction to Arthropods	AGB	165	(4)
Plant Identification	AGB	224	(4)
Insect Pests of Row, Truck and Field Crops	AGB	228	(4)
Insect Pests of Tree and Vine Crops	AGB	229	(4)

A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Principles of Pest Management	AGB	231	(3)
Agricultural Law and Regulations	AGB	301	(3)
Vertebrate Pest Management	AGB	323	(4)
Produce Market Quality	AGB	325	(3)
Bee Science	AGB	336	(3)
Urban Pest Management	AGB	342	(4)
Pest Control Practices	AGB	424	(3)
Career Planning in Agricultural Biology	AGB	372	(1)
Senior Project	AGB	461	(2)
Senior Project	AGB	462	(2)
Undergraduate Seminar	AGB	463	(2)
Internship in Agricultural Biology	AGB	441-442	(3)

(Choose 7 of the following:)

Regulatory Exclusion and Detection	AGB	322	(4)
Insect Population Behavior	AGB	377	(3)
Field Entomology	AGB	401	(4)
Biological Control	AGB	403	(4)
Fruit and Vegetable Standards	AGB	426	(4)
Advanced Pest Management	AGB	448	(4)
Identification of Immatures	AGB	455	(3)
Plant Growth Regulators	AGB	470	(3)
Soil Fertility and Fertilizers	SS	233	(4)

SUPPORT COURSES

(Required of all students)

Introduction to Statistics	STA	107	(4)
Weeds and Weed Control	AGR	330	(4)
Plant Structures and Functions	BOT	124	(5)
College Chemistry	CHM	105	(3)
College Chemistry Laboratory	CHM	142	(1)
Basic Soil Science	SS	231	(4)
Restricted Electives			(21)

See Department Advisor for courses

GENERAL EDUCATION COURSES

Category I:

A. Freshman Eng I	ENG	104	(4)
B. Advocacy and Argument	COM	204	(4)
C. Freshman Composition	ENG	105	(4)
or			
Report Writing	COM	216	(4)

Category II:

A. College Algebra	MAT	105	(4)
or Trigonometry	MAT	106	
B. College Chemistry	CHM	104	(3)
College Chemistry Laboratory	CHM	141	(1)
C. Basic Biology	BIO	115	(5)
D. Select one course from Area D			(4)

Category III:

Select one course from each area.

Minimum total			(12)

Category IV:

A. Management Accounting	ABM	324	(4)
Select one course from areas B and C			(8)

Category V:

PSY 201			(4)

Category VI:

Select two of the following:

AMC 201 or PLS 201 and AMC 202 or HST 202			(8)

Category VII:

Ag Enterprise Mgmt	ABM	328	(4)
Personnel Mgmt	ABM	402	(4)
Unrestricted Electives			(4)

PEST MANAGEMENT MINOR

Intro to Arthropods	AGB	165	(4)
Principles of Pest Control	AGB	231	(4)
Insect Pests of Row, Truck & Field Crops	AGB	228	(4)
Insect Pests of Tree and Vine Crops	AGB	229	(4)
Pesticide and Ag Laws and Regulations.	AGB	301	(3)

(Students select additional 8 units from courses below)

Vertebrate Pest Management	AGB	323	(4)
Urban Pest Management	AGB	342	(4)
Biological Control	AGB	403	(4)
Advanced Pest Management	AGB	448	(3)
Weeds and Weed Control	AGR	330	(4)

AGRICULTURAL BIOLOGY MINOR

(Required of all students)

Intro to Arthropods (or ZOO 226)	AGB	165	(4)
Principles of Pest Management	AGB	231	(4)
Plant Identification	AGB	224	(4)
Ag Laws and Regulations	AGB	301	(3)
Regulatory Exclusion/Detection of Pests	AGB	322	(4)
Produce Market Quality	AGB	325	(3)
Fruit and Vegetable Standards	AGB	326	(4)

(Students select 4 units from courses below)

Insect Pests of Row, Truck and Field Crops	AGB	228	(4)
Insect Pests of Tree and Vine Crops	AGB	229	(4)
Weeds and Weed Control	AGR	330	(4)
Vertebrate Pest Management	AGB	323	(4)
Crop Diseases	AGB	421	(4)

Course Descriptions

F, W, Sp, Su notations indicate the quarter(s) each course is normally offered.

† All courses offered in Agricultural Biology may be taken on a CR/NC basis except for students who are majors or minors. AGB 165 may not be taken on a CR/NC basis.

AGB 100 Insects and Civilization (4)

An analysis of insects and their relationship to man which ranges from everyday life to the development of civilization. A survey of insects and their relatives as to their importance in disease, health, everyday life and as pests of structures, fabric, stored products and crops; beneficial aspects. Analysis of need for pesticides and their side effects on man and the environment. For nonbiological science and nonagriculture majors. 4 lectures-analysis.

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) FSp

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 Control (3) W

Concepts of pest management in agricultural, industrial, urban and structural situations. Pesticide categorization, toxicology, safety and formulation. Mechanical, physical, cultural and biological control in pest management systems. 3 lectures.

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 Pesticide and Agricultural Laws and Regulations (3) FSp

A discussion of Federal and State Laws and regulations affecting individuals, corporations, and agencies involved in promoting and protecting California's agriculture and related industries. Emphasis on laws and regulations for agricultural and urban pest control. Pesticide safety included. Case studies. 3 lecture-analysis.

AGB 321 Urban Wildlife Pests and Civilization (3)

The symbiotic relationship and resulting conflicts between man and wildlife in urban, residential, recreational and industrial environments. Biology, ecology and management principles of animal pests (commensal rodents, birds and other small vertebrate animals) transmitting disease, damaging structures and landscaping, and influencing land stability. Analysis of damage leading to written recommendations. 3 lecture-analysis.

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

Diagnosis, analysis and management of vertebrate pest damage in plant and animal production settings. Identification, biology, and ecology of vertebrate pests (small animals and birds to large predators). Evaluation of damage, control measures, non-target wildlife hazards and computer modeling. Program development and laws and regulations. 3 lecture-analysis, 1 three-hour laboratory.

AGB 325 Produce Market Quality (3) F

The marketing of quality fruits and vegetables from growers to consumers. Identification, cause and analysis of defect factors resulting from insects, mites, nematodes, birds, mammals, plant diseases and nonparasitic disorders on marketing of fruits and vegetables. Written analytical reports required. 2 lectures-analysis, 1 three-hour laboratory. Prerequisite: AGB 228, 229, BOT 323, or consent of instructor.

AGB 333 Medical Entomology (3) F

Arthropod 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 structures, wood, and stored products; recognition of stages and damage; life histories and means of control; related laws and regulations. 3 lectures, 1 three-hour laboratory. Prerequisite: AGB 165 or equivalent.

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) F

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) Sp

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) F

Summation of entomology courses through field observation and analysis of pest levels leading to written recommendations for control. Weekly field trips to agricultural areas required with written reports on trips. 2 lecture-analysis, 1 three-hour laboratory. Prerequisite: Senior standing and consent of instructor.

AGB 426 Fruit and Vegetable Standards (4) W

Analysis and interpretation of quality provisions of the Agricultural Code relating to fruits, nuts, vegetables, eggs and honey. Analysis of minimum standards for marketing, including maturity, containers, marketing and size requirements. Written reports required. 3 lecture-analysis, three-hour laboratory. Prerequisite: AGB 325.

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. 2 lectures, 1 three-hour laboratory.

AGB 455 Identification of Immature Arthropods (3) W

The identification of immature arthropods through analysis and interpretation of dichotomous keys. Emphasis on those orders of insects with complete metamorphosis. 1 lecture-analysis, 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 ductive and deductive methods, that inferences in contemporary literature are based on fact or a logical, unanbiguous 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 majors offered in the agricultural business management department/agricultural education is agricultural business management. For other programs in this department see international agriculture and agricultural education.

David C. Whaley, *Chair*

Edison I. Cabacungan, William C. Hughes, Arthur F. Parker, A. Reza Hoshmand, Marvin L. Klein, 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)
Ag Marketing	ABM	304	(3)
Ag Labor Management	ABM	308	(4)
Ag Economics	ABM	311	(4)
Ag Policy	ABM	313	(4)
Management Accounting	ABM	324	(4)
Ag Financial Analysis	ABM	325	(3)
Ag Enterprise Management	ABM	328	(4)
Ag Data Management	ABM	375	(4)
Personnel Management	ABM	402	(4)
Senior Project	ABM	461	(2)
Senior Project	ABM	462	(2)
Undergraduate Seminar	ABM	463	(2)
Quant. Analysis for Ag	ABM	476	(4)

OPTION COURSES FOR*

(Required in specific options)

AGRICULTURAL ECONOMICS

Mgmt of Ag Org	ABM	201	(3)
Ag Enterprise Acct	ABM	340	(4)
Ag Water Res Util	ABM	350	(3)
Ag Coops	ABM	360	(3)
Ag Prices	ABM	403	(4)
Food & Ag Mktg Apps	ABM	405	(3)
Ag Mkt Res Tech	ABM	413	(3)
Trans Ag Commod	ABM	416	(3)
Global Res. for Food	IA	101	(4)
Princ of Economics	EC	202	(4)
Career Directed Option Courses Minimum of 12 units from following:			
Leg Env of Bus Trans	FRL	201	(4)
Leg Env of Bus Org	FRL	302	(4)
Fortran	CS	125	(4)
Money & Banking	EC	308	(4)
Int'l Trd Theo & Pol	EC	404	(4)
Intr Calc for Bus	MAT	125	(4)
Ag Prod Courses (Advisor Approval)			22
Unrestricted Electives			10

FOOD DISTRIBUTION

Complete minimum of 23 units from the following:

Mgmt of Ag Org	ABM	201	(3)
Ag Sales/Serv Mgmt	ABM	202	(4)
Ag Suprv & Trng	ABM	203	(2)
Adv/Prom Ag Prod	ABM	225	(3)
Calif & Wrld Ag	ABM	300	(4)
Ag Com Mkt Fut Trd	ABM	305	(3)
Whls & Ret of Ag Prod	ABM	306	(4)
Ag Ent Acctg	ABM	340	(4)
Ag Prices	ABM	403	(4)
Food & Ag Mktg Apps	ABM	405	(3)
Land Appraisal	ABM	406	(4)
Ag Mkt Res Tech	ABM	413	(3)
Trans Ag Commod	ABM	416	(3)
Equine Invest. Mgmt	ABM	429	(3)
Global Res for Food	IA	101	(4)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Career Directed Option Courses Minimum of 39 units:

Prin of Econ	EC	202	(4)
Leg Env of Bus Trans	FRL	201	(4)
Leg Env of Bus Org	FRL	302	(4)
Harvest & Mktg	AGR	224	(4)
Meat Utilizatn	AS	327	(4)
Intro Mass Comm	COM	101	(4)
Fruit Sci Fund	FI	101	(3)
Intro to Foods	FN	121	(4)
Wines & Spirits	HRT	215	(4)
Restaurant Mgmt	HRT	405	(4)
Hotel Rest Mgmt Law	FRL	310	(4)
Prof Selling	MKT	208	(4)
Landscape Hort Prin & Practices	OH	131	(4)

(Required of all in option)
Unrestricted Electives 16

MANAGEMENT

Minimum of 28 units from following:

Global Res for Food	IA	101	(4)
Mgmt Ag Organiz	ABM	201	(3)
Ag Sales/Serv Mgmt	ABM	202	(4)
Ag Suprv & Trn	ABM	203	(2)
Adv/Prom Ag Prod	ABM	225	(3)
Calif & Wrld Ag	ABM	300	(4)
Ag Com Mkt Fut Trd	ABM	305	(3)
Whls & Ret of Ag Prod	ABM	306	(4)
Equine Mgmt	ABM	329	(3)
Int'l Mkt Food & Fiber Prod	ABM	330	(3)
Ag Ent Acctg	ABM	340	(4)
Ag Water Res Util	ABM	350	(3)
Ag Coops	ABM	360	(3)
Ag Prices	ABM	403	(4)
Food & Ag Mktg Apps	ABM	405	(3)
Land Appraisal	ABM	406	(4)
Ag Mkt Res Tech	ABM	413	(3)
Trans of Ag Com	ABM	416	(3)
Equine Inv Mgmt	ABM	429	(3)

(Required of all in option)

Prin of Econ	EC	202	(4)
Leg Env of Bus Trans	FRL	201	(4)
Leg Env of Bus Org	FRL	302	(4)
Animal Ag Science	AS	111	(4)

Career Emphasis Courses .....(23)
(Depth emphasis based upon advisor and dept. approval)
Unrestricted Electives 11

GENERAL EDUCATION

Category I

a. Freshman English I	ENG	104	(4)
b. Advoc and Arg	COM	204	(4)
c. Report Writing	COM	216	(4)

Category II

a. Intro to Statistics	STA	120	(4)
b. Choose one course			(4)
c. Choose one course			(4)
d. Choose one course			(4)

Category III

a. Choose one course			(4)
b. Bus/Prof Ethics	PHL	205	(4)
c. Choose one course			(4)

Category IV

a. Prin of Econ	EC	201	(4)
b. Choose one course			(4)
c. Choose one course			(4)

Category V

General Psychology	PSY	201	(4)

Category VI

a. American Civ	AMC	201	(4)
or			
Intro to Am. Gov.	PLS	201	(4)
b. American Civ	AMC	202	(4)
or			
U.S. History	HST	202	(4)

Category VII
See Advisor

AGRICULTURAL BUSINESS MANAGEMENT MINOR

Intro to Ag Business	ABM	101	(4)
Ag Policy	ABM	313	(4)
Mgmt Acctg	ABM	324	(4)
Ag Financial Analysis	ABM	325	(3)
Ag Entrprs Mgmt	ABM	328	(4)

Select 17 units from following:

Mgmt of Ag Org	ABM	201	(3)
Ag Sales & Serv Mgmt	ABM	202	(4)
Ag Supervsn & Trng	ABM	203	(2)
Adv & Prom of Ag Prod	ABM	225	(3)
Calif & Wrld Ag	ABM	300	(4)
Ag Mktg	ABM	304	(3)
Ag Com Mktg, Fut Trdg	ABM	305	(3)
Whlsl & Retlng of Ag Prod	ABM	306	(4)
Ag Labor Mgmt Rel	ABM	308	(4)
Ag Prod Econ	ABM	311	(4)
Equine Ent Mgmt	ABM	329	(3)
Int Mktg Food & Fiber Prod	ABM/IA	330	(3)
Ag Ent Acctg	ABM	340	(4)
Ag Water Res Utiliz	ABM/IA	350	(3)
Ag Coop	ABM/IA	360	(3)
Intro to Ag Data Mgmt	ABM	375	(4)
Personnel Mgmt	ABM	402	(3)
Ag Prices	ABM	403	(4)
Food & Ag Mktg Apps	ABM	405	(3)
Land Apprsl	ABM	406	(4)
Ag Mktg Res Techniques	ABM	413	(3)
Trans of Ag Commod	ABM	416	(3)
Equine Inv Mgmt	ABM	429	(3)
Quant Analysis for Ag	ABM	476	(4)

Course Descriptions

† All Departmental offerings may be taken on a CR/NC basis except for majors in the department.

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)

A comprehensive overview of management fundamentals emphasizing the study of management and business organizations in the contemporary food and agricultural system. Includes various management theories, approaches and techniques and how they might be applied to organizations within the food and agricultural system. The conflict between organizational and personal values will also be covered. 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 California and World Agriculture (4)

Discussion and analyses of contemporary issues of agriculture in California and the World. Overview of issues such as the resource base, the environmental consequences of production, sustainable agriculture, and designing a sustainable economic system for California and the World will be provided. 4 lecture-discussions. Prerequisite: ECON 201 or consent of 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; chain stores, 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. Field trip required. 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 314 Managerial Statistics (4)

Business application of techniques that require knowledge of data distributions such as binomial, Poisson, and normal; probability; sampling theory. Use of statistical tests for inference such as estimation, hypothesis testing, Chi-Square, regression and correlation. 3 lecture-problem solving, 1 two-hour activity. Prerequisite: STA 120 or equivalent.

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.

ABM 329 Equine Enterprise Management (3)

Equine enterprise analysis with emphasis on capital acquisition, leasing, land acquisition, legal problems and labor problems. 3 lectures. Prerequisites: ABM 328, AS 325.

ABM 330 International Marketing of Food and Fiber Products (3)

Marketing of food, fiber and horticultural 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 food and fiber products. Management practices and problems of firms involved in exporting and importing textiles and garments, livestock, fruits, vegetables, grains and other food and fiber products. 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 375 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: MAT 105, 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 (4)

Management-employee relations and theory; employee motivation; union and management relations; recruitment and selection; performance appraisal; communications; individual and group incentive systems; employee counseling; labor legislation; wage determination and salary systems; employment and unemployment. Case studies analyzed. Seminar discussions held, role playing emphasized, guest speakers. 4 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 405 Food and Agricultural Marketing Applications (3)

An application of theories, principles and procedures involved in developing a marketing strategy. Students will work as a team to develop a marketing plan for an agricultural product. Topics covered will include all aspects of food and fiber market strategy planning such as identifying a target market, analyzing market opportunites, developing a marketing mix, and completing a budget for the plan. Course requirement: Current NAMA membership. 2 lectures, 1 three-hour laboratory.

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 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. 3 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 429 Equine Investment Management (3)

In-depth analysis of equine investments. Emphasis on capital acquisition, equine tax law, limited partnerships, joint ventures, and stallion or mare syndications. 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 Quantitative Analysis for Agriculture (4)

Application of statistical and other quantitative techniques employed in agricultural economic and operations analysis. Areas covered include statistical forecasting, resource allocaiton, break-even analysis, project management and inventory control. 3 lectures, 1 three-hour laboratory. Prerequisite: ABM 375.

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.

ABM 575 Statistics for Agriculture (4)

A summary of statistical tools and techniques used in agriculture. Application of computer to selected statistical techniques. Open to graduate students only. 4 lectures.

AGRICULTURAL ENGINEERING

Joe Y.T. Hung, *Chair*
Ramesh Kumar
Floyd V. Matthews, Jr.
Charles M. Stark
Eudell Vis

Agricultural engineering is an expanding field of engineering that applies the knowledge and skills of science, physics, chemistry and mathematics to enhance the quality and quantity of agricultural production. Agricultural engineers are called upon to utilize engineering principles in such areas as food engineering, soil and water, electric power and processing, power and machinery, and 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. 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 learn how to design machines for automatic harvesting of fruits and vegetables and study the power testing of tractors, hydraulic systems, and the effects of noise and vibrations on the equipment operator. Cal Poly offers a strong emphasis in irrigation, both in agriculture and landscape irrigation systems design. This department is at the forefront in the application of drip or trickle irrigation methods as adapted to agriculture and landscape irrigation systems design as well as the conservation of water.

The agricultural engineering curriculum is accredited by the Accreditation Board for Engineering and Technology (ABET). Students desiring to major in agricultural engineering should have a particularly high aptitude for science and mathematics, and incoming freshmen should have taken substantial college preparatory courses in these disciplines in high school. Incoming transfer students should have completed at least one year of college calculus and one year of college physics (with laboratory) prior to begninning the program at Cal Poly. The community college student planning to transfer into this department should consult a school counselor or his department to determine which courses meet the program requirements.

Students are urged to consider the Integrated General Education (IGE) program as a valuable means of satisfying the General Education requirements of the degree.

Graduates of the program are prepared to do production work in their first jobs as well as to grow with their profession throughout their engineering careers. The curriculum is designed to prepare a student for direct entry into the engineering profession and for graduate school.

Agricultural engineering students are encouraged to become active in the student branch of the American Society of Agricultural Engineers and the Agricultural Engineering Club.

CORE COURSES FOR MAJOR*

(Required of all students)

Introduction to Agricultural Engineering	AE	101	(1)
Design Graphics and Workshop Activities	AE	103	(3)
Engineering Analysis of Agricultural Machines	AE	210	(3)
Processing Equipment and Procedures for Agricultural Products	AE	234	(3)
Agricultural Engineering Surveying	AE	245	(3)
Agricultural Engineering Computations	AE	252	(4)
Strength of Biological Materials	AE	330	(3)
Food Process Engineering	AE	332	(4)
Instruments and Controls	AE	350	(3)
Human Engineering	AE	410	(2)
Hydraulic Systems	AE	411	(3)
Farm Power and Machinery Design	AE	415	(4)
Agricultural Environments and Structures	AE	420	(3)
Irrigation Engineering	AE	440	(4)
Erosion Control & Drainage Engineering	AE	441	(4)
Senior Project	AE	461	(2)
Ag Engr Design	AE	464	(4)
Applied Elec Engr	ECE	232	(4)
Strength of Mtrls	ME	218	(3)
Strength of Mtrls	ME	219	(3)
Strength of Mtrls Laboratory	ME	220	(1)
Thermodynamics	ME	301	(4)
Fluid Mechanics	ME	311	(3)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Analytic Geometry and Calculus	MAT	116	(4)
Calculus of Several Variables	MAT	214	(3)
Calculus of Several Variables	MAT	215	(3)
Differential Equations	MAT	216	(4)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
General Physics	PHY	133	(3)
General Physics Lab	PHY	153	(1)
Basic Soil Science	SS	231	(4)
General Physics	PHY	132	(3)
General Physics Lab	PHY	152	(1)
General Chemistry	CHM	112	(3)
General Chemistry Laboratory	CHM	152	(1)
Ag Sci Elec (restr'd See advisor)			(3)

Engr Design Elect
(restricted) ..... (8)
Engr Science Elect
(restricted) ..... (4)
UNRESTRICTED ELECTIVES ..... (0)

GENERAL EDUCATION COURSES

Category I

Freshman English I	ENG	104	(4)
Advocacy and Argument	COM	204	(4)
Report Writing	COM	216	(4)

Category II

Analytic Geometry and Calculus	MAT	114	(4)
Analytic Geometry and Calculus	MAT	115	(4)
General Physics	PHY	131	(3)
General Physics Lab	PHY	151	(1)
Plants and Civ	AGR	111	(4)
Life Science	BIO	110	(3)
General Chemistry	CHM	111	(3)
General Chemistry Laboratory	CHM	151	(1)

Category III
Area A ..... (4)
Area B: Ethics and Engineering Decision Making ..... CPU 401 (4)
Area C ..... (4)

Category IV
Any course from Area A ..... (4)

Introduction to Geography	GEO	102	(4)
or Principles of Sociology	SOC	201	

Any Course from Area C ..... (4)

Category V
Any Course from G.E. list ..... (4)

Category VI

American Civilization	AMC	201	(4)
or Introduction to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	

Category VII

Engineering Economic Decision Analysis	IE	401	(4)
Production Liability and Patents	EGR	401	(4)

LANDSCAPE IRRIGATION DESIGN MINOR

Utility Systems	AE	122	(2)
Landscape Hydraulics	AE	221	(4)
Micro Computers	AE	251	(3)
Landscape Sprinkler Irrigation	AE	321	(4)
Drip Irrigation	AE	340	(3)
Landscape Drainage	AE	341	(4)
Landscape Irrigation Remote Controls	AE	451	(3)
Landscape Irrigation Trouble Shooting	AE	452	(3)
College Algebra	MAT	105	(4)
Landscape Drafting	PA	211	(4)

Total units required in minor ..... (34)

Course Descriptions

+ All courses offered by the department may be taken on a CR/NC basis except for major.

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)

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 lecture-problems, 1 three-hour laboratory. This is a service course for students in majors other than agricultural engineering.

AE 103 Design Graphics and Workshop Activities (3)

Basics of design graphics including drawings for construction of various Ag Engr projects. Basic instruction in tools, equipment, and techniques for working with wood, metal, and concrete. 1 lecture-problem and 2 three-hour laboratories. 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 lecture-problems and 1 three-hour laboratory. Prerequisite: MAT 105 or equivalent. This is a service course for students in majors other than agricultural engineering.

AE 121 Construction Fundamentals (2)

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. This is a service course for students in majors other than agricultural engineering.

AE 122 Utility Systems (2)

Electrical power and lighting systems. Electrical principles, codes, construction techniques and wiring practices. Fundamentals of water pressure systems. Methods of installation. 1 lecture-problem, 1 three-hour laboratory. This is a service course for students in majors other than agricultural engineering.

AE 123 Welding (2)

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. This is a service course for students in majors other than agricultural engineering.

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 lecture-problems and 1 three-hour laboratory. This is a service course for students in majors other than agricultural engineering.

AE 131 Surveying Fundamentals (2)

Measurement of distances, elevations, angles, and directions. Care and use of surveying equipment. Contours, maps, field notes, calculation methods. 1 lecture-problem, 1 three-hour laboratory. Prerequisite: MAT 105 or 106 or equivalent. This is a service course for students in majors other than agricultural engineering.

AE 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.

AE 210 Engineering Analysis of Agricultural Machines (3)

A functional analysis of soil working tools, planting equipment, pest control equipment, and harvesting equipment. Study of tractor and mechanical power as used in agricultural operations. 2 lecture-problems, 1 three-hour laboratory.

AE 221 Landscape Hydraulics (4)

Principles of hydrostatics, dynamics, problems involving pipe flow and channel flow specifically applied to landscape irrigation and drainage systems. Also includes related problems in water flow, such as storage tanks, water hammer, pumps, and water fountains. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: PHY 121 or MAT 105. Not open to engineering majors. This is a service course for students in majors other than agricultural engineering.

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 presentation, 3 hours of laboratory. Can be repeated for a maximum of 4 units of letter grade and additional 2 units of credit/no credit. This is a service course for students in majors other than agricultural engineering.

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 lecture-problems and 1 three-hour laboratory. Prerequisite: MAT 106. This is a service course for students in majors other than agricultural engineering.

AE 233 Pest Control Equipment (3)

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 105 or 106 or equivalent. This is a service course for students in majors other than agricultural engineering.

AE 234 Processing Equipment and Procedures for Agricultural Products (3)

Introduction to pumps, fans, sizing, sorting and materials handling equipment; the application of psychrometrics to drying systems for agricultural products. 3 lecture-problems. Prerequisites: AE 101 and PHY 132.

AE 240 Irrigation (4)

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 lecture-problems. 1 three-hour laboratory. Prerequisite: AE 131, SS 231, MAT 105 or 106 or equivalent. This is a service course for students in majors other than agricultural engineering.

AE 241 Tractors (2)

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. This is a service course for students in majors other than agricultural engineering.

AE 245 Agricultural Engineering Surveying (3)

Measurement of distance, elevations, angles, and directions, contours, maps, plane table mapping, earth yardage for land forming, cuts and fills, photogrammetry with applications in agricultural construction, drainage, and irrigation. 2 lecture-problems, 1 three-hour laboratory. Prerequisites: AE 101 and MAT 114

AE 251 Microprocessors and Computers (3)

Programming of microprocessors and computers. Selection criteria for hardware and software related to problem solving. 2 lecture-problems and 1 three-hour laboratory. This is a service course for students in majors other than agricultural engineering.

AE 252 Agricultural Engineering Computations (4)

Applications and use of computers in the agricultural engineering profession. Problem solving using FORTRAN. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: MAT 114.

AE 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.

AE 301 Facilities Maintenance Technology (4)

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. 3 lecture-problems and one three-hour laboratory. Prerequisite: MAT 105 or equivalent. This is a service course for students in majors other than agricultural engineering.

AE 321 Landscape Sprinkler Irrigation (4)

Soil-water plant relations, engineering sprinkler system layout, selection of sprinkler irrigation equipment such as sprinklers, valves, controllers and specialty devices to abide by the codes and regulations. Single drip system design is also included. Analysis of cost and irrigation management and maintenance are also included. 3 lecture-problems and 1 three-hour laboratory. Prerequisites: AE 122 or AE 221, SS 231, MAT 105 or 106 or equivalent. This is a service course for students in majors other than agricultural engineering.

AE 330 Strength of Biological Materials (3)

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 lecture-problems. Prerequisite: ME 219, and MAT 216.

AE 332 Food Process Engineering (4)

Application of fluid mechanics, heat transfer, and thermodynamics to the processing of food. Drying, evaporation, dehydration, and freezing for the preservation of foods. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: AE 234, ME 301, ME 311, or consent of instructor.

AE 340 Drip Irrigation (3)

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 lecture-problems, 1 three-hour laboratory. Prerequisite: AE 240 or AE 321. This is a service course for students in majors other than agricultural engineering.

AE 341 Landscape Drainage (4)

Drainage problems related to landscaping, such as sizes of storms, and surface runoff. Calculations of storm sizes with different frequencies. Minimizing and prevention of damage due to runoff or erosion. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: AE 221. This is a service course for students in majors other than agricultural engineering.

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. 2 lecture-problems and one three-hour laboratory. Prerequisites: MAT 216, PHY 133.

AE 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.

AE 410 Human Engineering (2)

Human factors in the design of agricultural equipment and facilities. Effect of noise, vibrations, temperature, humidity, etc. on human performance and ability to operate equipment. Design of locations of controls and sensing equipment with respect to body dimensions. 2 lecture-problems. Prerequisite: Junior, senior standing, or consent of instructor.

AE 411 Hydraulic Systems (3)

Hydraulic system components used in agricultural machines and facilities. Design of hydraulic systems for powering, sensing and controlling machine functions. 2 lecture-problems and 1 three-hour laboratory. Prerequisite: MAT 216.

AE 415 Farm Power and Machinery Design (4)

Design of agricultural machinery and components such as agricultural v-belts, chains, couplings, drawbar, axle and shaft. Horsepower requirements of agricultural equipment and engine selection and testing. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: AE 210, ME 215, ME 219.

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 lecture-problems and 1 three-hour laboratory. Prerequisites: AE 332, ME 219.

AE 440 Irrigation Engineering (4)

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 lecture-problems. 1 three-hour laboratory. Prerequisite: ME 311.

AE 441 Erosion Control and Drainage Engineering (4)

Analysis of hydrological events which impact on land drainage problems, erosion and floods. Engineereing design for reducing erosion due to water, wind and other artificial and natural causes. Engineering design for reducing excessive water in the soil to improve crop production. Flood routing analysis and design of erosion control and drainage structures. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ME 311

AE 451 Landscape Irrigation Remote Controls (3)

Basic electricity and electronic principles applied to automating landscape irrigation systems. Analysis of different types of irrigation controllers and electric valves. Hydraulic theories applied to irrigation controllers and valves are also included. 2 lecture-problems, 1 three-hour laboratory. Prerequisites: AE 122, AE 221. This is a service course for students in majors other than agricultural engineering.

AE 452 Landscape Irrigation Trouble Shooting (3)

Prevention and analysis of problems and failures in landscape irrigation systems, such as irrigation controllers, remote control valves, wiring failures, sprinklers and drip system failures. Other specialty items such as cross connections, pressure regulators, vacuum breakers, pipes, etc. will be included. 2 lecture-problems, 1 three-hour laboratory. Prerequisite: AE 451. This is a service course for students in majors other than agricultural engineering.

AE 461 Senior Project (2)

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 engineering report.

AE 464 Agricultural Engineering Design (4)

Design of structures, machines, and processes common in agriculture, water, and food-related fields. Design procedures based on theory and accepted engineering practices for specific problems. Students will be expected to go through the entire design procedure for a given problem. 4 lecture-problems. Prerequisite: Senior standing.

AE 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 EDUCATION

David C. Whaley, *Chair, Agricultural Business Management and Agricultural Education; Graduate Coordinator, M.S. in Agriculture, Agricultural Science Option*

Flint Freeman, *Coordinator, Agricultural Education*

The primary function of the agricultural education program is the preparation of teachers of agricultural education 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 College of Agriculture and other Colleges including the School of Education.

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 College 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 the waiver program in agriculture or receiving a passing score on the National Teachers Exam in Agriculture.

In addition to coursework in four areas of agriculture, students who plan to teach 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 option.

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 Education Program 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 an option in agricultural 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)
Intro Farm Power and Mach	AE	110	(3)
Construction Fundamentals	AE	121	(2)
Utility Systems	AE	122	(2)
Welding	AE	123	(2)
Surveying Fundamentals	AE	131	(2)
Irrigation	AE	240	(4)
Tractors	AE	241	(2)
Dev of Competitive Ag Activities	AG	250	(2)
Intro to Ag Ed Programs	AG	300	(3)
Technological Applications in Ag Ed	AG	410	(3)
Ag Skills & Facilities	AG	420	(3)
Senior Project	AG	461	(2)
Senior Project	AG	462	(2)
Undergraduate Seminar	AG	463	(2)
Field Experiences in Ag Ed	AG	441	(4)
Introduction to Arthropods	AGB	165	(4)
Pesticide & Agricultural Law and Regulations	AGB	301	(3)
Vegetable Crop Production	AGR	226	(4)
Irrigated Pastures	AGR	333	(4)
Feeds and Feeding	AS	101	(4)
Swine Management Science	AS	122	(4)
or Poultry Management Science	PS	131	(4)
Sheep Management Science	AS	123	(4)
Equine Management Science	AS	125	(4)
Beef Cattle Managment Science	AS	131	(4)
Meat Science	AS	227	(3)
or Meat Utilization	AS	327	
Intro Livestock Eval	AS	241	(2)
Pomology	FI	203	(4)
Horticultural Production Practices	OH	132	(3)
Basic Floral Design	OH	223	(3)
Greenhouse Management	OH	323	(4)
Basic Soil Science	SS	231	(4)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Secondary School Health Education	PE	442	(3)
Unrestricted Electives			(13–14)

GENERAL EDUCATION COURSES

(Required of all students)

Global Resources for Food	IA	101	(4)
American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Culture, People, and Dress	HE	138	
Basic Biology	BIO	115	(5)
Plants & Civ	AGR	111	(4)
College Chemistry	CHM	104	(3)
College Chemistry	CHM	141	(1)
Freshman English I	ENG	104	(4)
History of Civilization	HST	101	(4)
College Algebra	MAT	105	(4)
Logics and Semantics	PHL	202	(4)
General Psychology	PSY	201	(4)
Adolescent Psychology	PSY	312	(4)
Cognitive Processes	PSY	334	(4)
Educational Psychology	PSY	340	(4)
U.S. History	HST	201	(4)
Public Speaking	COM	100	(4)
Elementary Spanish	FL	151	(4)
History of Gardens & Parks	PA	214	(4)

SINGLE SUBJECTS TEACHING CREDENTIAL *

Students wishing teacher certification in agriculture are required to show competency in four areas of agriculture. This can be accomplished by receiving a passing score on the National Teachers Examination in Agriculture or completing the waiver program in agriculture. Interested individuals should contact the Agricultural Education Program Coordinator for additional information.

Waiver Program

Ag Business Management (8)			
Management Accounting	ABM	324	(4)
Agricultural Enterprise Management	ABM	328	(4)
Plant Production (26)			
Introduction to Arthropods	AGB	165	(4)
Vegetable Crop Production	AGR	226	(4)
Pomology	FI	203	(4)
Basic Soil Science	SS	231	(4)
Horticultural Production Practices	OH	132	(3)
Basic Floral Design	OH	223	(3)
Greenhouse Management	OH	323	(4)
Animal Production (18)			
Feeds and Feeding	AS	101	(4)
Swine Management Science	AS	122	(4)
or Poultry Management Science	PS	131	
Sheep Management Science	AS	123	(4)
Beef Cattle Management Science	AS	131	(4)
Meat Science	AS	227	(3)
or Meat Utilization	AS	327	
Agricultural Mechanics (18)			
Introduction to Farm Power	AE	110	(3)
Construction Fundamentals	AE	121	(2)
Utility Systems	AE	122	(2)
Welding	AE	123	(2)
Surveying Fundamentals	AE	131	(2)
Irrigation	AE	240	(4)
Tractors	AE	241	(2)
Ag Skills and Facilities	AG	420	(3)

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:

Field Experiences in Ag Ed	AG	441	(4)
or Field Experience—Intro to Schooling	EDU	301	
Procedures in Agricultural Education	AG	440	(4)
Dynamics of Teaching in a Pluralistic Society	EDU	420	(4)
Psychology in the Instructional Process	EDU	421	(3)
Teaching Reading in the Content Area	EDU	432	(4)
Secondary Student Teaching I	EDU	435	(9)
Seminar: Secondary Student Teaching I	EDU	436	(2)
Secondary Student Teaching II	EDU	437	(9)
Field Practices and Supervision	AG	450	(3)
Exceptional Child & Youth	EDU	454	(3)
Technological Applications in Ag Ed	AG	410	(3)
or Educational Comp Tech Sci	EDU	455	(3)
Secondary School Health Education	PE	442	(3)

A minimum 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 agriculture must complete the requirements for the single subjects credential and the requirements for the agricultural specialist credential.

The courses include:

Intro to Ag Ed Programs	AG	300	(3)
Special Problems	AG	400	(2)
Agriculture Skills & Facilities	AG	420	(3)
Young and Adult Programs and Youth Leadership	AG	505	(3)
Program Planning and Development	AG	530	(3)

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*.

* 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 Education Program Coordinator 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 Agricultural Education Programs (3)

Overview of agriculture programs including goals and purposes. Qualifications essential to success in agricultural education. Programs of studies to meet requirements for instruction in 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 410 Technological Applications in Agricultural Education (3)

The development and integration of computer literacy in the pedagogical and agricultural fields. Instructional focus will be on the competent infusion of computer technology and awareness in the organizational, delivery, and managerial domains of agricultural education. Study of pervasive issues of computer technology in this society, terminology, computer systems, data terminal devices, communications media, computer assisted instruction (simulations, demonstrations, tutorials, drill and practice), and computer managed instruction (word processing, database management, graphics, spreadsheets, telecommunications, grading programs, and media development). A special project undertaken by each student will promote the development and integration of problem-solving skills, critical thinking, or creative processes with regard to computer technology and agriculture. Two hour lecture problem-solving, two hour practicum.

AG 420 Agriculture Skills and Facilities (3)

Development, operation, and management of agriculture facilities. Skills necessary for classroom, laboratory, and school farm instruction in agricultural education will be demonstrated. Emphasis will be on facility management and individual skills development and assessments. 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 Field Experiences in Agricultural Education (4)

An overview of Agricultural Education in the public schools. Professional type experience new to the student so that a valuable contribution toward career development results. Supervised, focused observation/participation at the secondary school level. Written reports necessary.

AG 450 Field Practices and Supervision (3)

Organization and implementation of an instructional program in agriculture education. 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.

Gaylord P. Patten, *Chair, Plant and Soil Science Department*

Gerald L. Croissant, *Coordinator, Agronomy*

Charles W. Asbell Daniel G. Hostetler Victor Wegrzyn

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 curricular options receive excellent training in fundamental principles as well as the more technical and scientific areas. With the realization of increasingly diverse and complex occupational areas, Agronomy students also have the freedom to select from a list of more than 40 approved courses that will prepare them according to their specific goals.

Agronomy students at Cal Poly have a unique opportunity to obtain actual experience with 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. The rapidly developing need for Crop Consultants is of current primary concern and every effort will be made to train men and women to fill the many openings in this area.

Agronomy Minor

Agronomy *minor* is primarily for those students majoring in another discipline but have close ties to plant growth, production, and nutrition. It is a valuable curricular adjunct for those majoring in Botany, Landscape Architecture, Ornamental Horticulture, and Soil Science. The agronomy minor will also strengthen the academic background of those majoring in Agricultural Business Management, Agricultural Engineering, Agricultural Science, Animal Science, Biology, Foods and Nutrition, Fruit Industries, and International Agriculture.

CORE COURSES FOR MAJOR *

Cereal Crops	AGR	122	(4)
Forage Crops	AGR	123	(4)
Field Crops	AGR	221	(4)
Vegetable Crop Production	AGR	226	(4)
Weeds and Weed Control	AGR	330	(4)
Plant Breeding	AGR	404	(4)
Crop Diseases	AGR	421	(4)
Senior Project	AGR	461	(2)
Senior Project	AGR	462	(2)
Undergraduate Seminar	AGR	463	(2)
Introduction to Arthropods	AGB	165	(4)
Principles of Pest Management	AGB	231	(3)
Basic Soil Science	SS	231	(4)
Plant Structures and Functions	BOT	124	(5)

(Additional Units from Option List will meet 54-Unit requirement)

OPTION COURSES FOR MAJOR *

(Required for specific option)

Crop Production Option

Crop Production Option (30 units to be selected from approved departmental list with prior consent of advisor.) Note: 30 units for this option must be different than 30 units for Crop Science.

Basic Ag. Production and Management ..... (8)
Advanced Ag. Production and Management ..... (12)
Agricultural Business Management ..... (6)
Animal Science/Agricultural Engineering ..... (4)

Crop Science Option (30 units to be selected from approved departmental list with prior consent of advisor.) Note: 30 units for this option must be different than 30 units for Crop Production.

Basic Science ..... (16)
Advanced Science ..... (8)
Advanced Agricultural Science ..... (6)

SUPPORT AND ELECTIVE COURSES

Directed electives in following areas to be selected from approved departmental list with *prior* consent of advisor.

Agronomy Support ..... (8)
Science Support ..... (14)
Diversified Agriculture Support ..... (16)
Unrestricted Electives ..... (11)

GENERAL EDUCATION COURSES

Category-I: (Pattern 1 *or* 2) ..... (12)

Category II:

A. Any course ..... (4)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

B. College Chemistry ..... CHM 104 (3)
College Chemistry Laboratory .... CHM 141 (1)
C. Basic Biology ..... BIO 115 - (5)
D. Any course

Category III:
Select one course from areas A, B, & C ..... (12)

Category IV:
A. Mgmt. Accounting ..... ABM 324 (4)
Select one course from areas B and C ..... (8)

Category V:
Select one of the following:
CPU 202 or PSY 201 ..... (4)

Category VI:
Select one course from each area. Minimum total ... (8)
AMC 201 or PLS 201; AMC 202 or HST 202

Category VII:
A. Ag Enterprise Mgmt ..... ABM 328 (4)
B. Personnel Mgmt ..... ABM 402 (4)

AGRONOMY MINOR

Units Required—24

Upper Division Units Required—12

Required Courses (all students)
Plants and Civilization ..... AGR 111 ° (4)

Select 8 units from the following:
Cereal Crops ..... AGR 122 (4)
Forage Crops ..... AGR 123 (4)
Field Crops ..... AGR 221 (4)
Vegetable Crops ..... AGR 226 (4)

Select 8 units from the following:
Crop Technology ..... AGR 322 (4)
Weeds and Weed Control ..... AGR 330 (4)
Seed Production ..... AGR 331 (4)
Irrigated Pastures ..... AGR 333 (4)
Range Management ..... AGR 336 (4)

Select 3 or 4 units from the following:
Plant Breeding ..... AGR 404 (4)
Crop Diseases ..... AGR 421 (4)
Crop Management Operations ..... AGR 437 (3)

Course Descriptions

† All courses offered in Agronomy may be taken on a CR/NC basis except for majors.

AGR 111 Plants and Civilization (4)

Diversification and importance of economic crop plants including a critical review of some of the geological, pre- and historical facts leading to the domestication of world food staples. An examination of the division of labor in the plant cell. Personal, societal and global implications associated with plant domestication. An evaluation of world cropping. 4 lectures.

AGR 122 Cereal Crops (4)

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)

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)

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)

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)

Harvesting methods and procedures; current handling and packaging techniques; grades and grading, minimum standards, containers, storage; requirements of crops for processing, 3 lectures, 1 three-hour laboratory.

AGR 226 Vegetable Crop Production (4)

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 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.

AGR 322 Crop Technology (4)

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, or 224 or consent of instructor.

AGR 330 Weeds and Weed Control (4)

Recognition and control of weeds occurring in crop and range lands, ornamental plantings, and non-cropped situations. Classification of weeds. Cultural, chemical, and biological control practices. Laws and regulations. 3 lectures, 1 three-hour laboratory. Prerequisite: BIO 115 or BOT 124.

AGR 331 Seed Production (4)

California field, vegetable and flower seed production. Location and 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 or 226.

AGR 333 Irrigated Pastures (4)

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)

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 (4)

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. 2 one-hour lecture, 2 three-hour laboratories. Prerequisite: AE 110 or AE 241 and any crop production course, or by permission of the instructor.

AGR 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.

AGR 404 Plant Breeding (4)

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)

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)

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)

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)

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: Student must take GWT before enrollment in AGR 461.

AGR 463 Undergraduate Seminar (2)

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. Prerequisite: AGR 462

AGR 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.

ANIMAL SCIENCE

G. Duane Sharp, *Chair*

Leo B. Abenes
Robert E. Bray
Melinda J. Burrill
Allen C. Christensen
Edward A. Cogger
Norman K. Dunn
Edward S. Fonda
Gerald E. Hackett, Jr.
Eugene K. Keating
Mack H. Kennington
Cedric Y. Matsushima
Laurie Lee Moise
C. Robert Nett
John E. Trei
Steve I. Wickler
Adolph A. Wysocki

A four-year curriculum leading to a Bachelor of Science degree in Animal Science with options in preveterinary science, animal management science, Equine Industry, 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 of purebred Duroc and a herd representative of commercial breeds of swine; and flocks of laying hens, 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 university 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 management science 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-businesses of non-ranch types. Particular emphasis is given to agri-businesses needing animal specialists as a part of their management or marketing team.

The Equine Industry option is designed to prepare students for employment as managers and related agri-business opportunities in the equine industry. The option combines course work in equine production, nutrition, breeding, genetics and diseases with studies in the management aspects of an equine enterprise.

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 32 units, 9 of which must be upper division.

PHYSIOLOGY MINOR

The Physiology Minor is an interdisciplinary program which can be elected by students majoring in any field. Its purpose is to improve the training and advising of students in order to facilitate their pursuit of careers in biomedical fields utilizing a knowledge of Physiology. It is particularly appropriate for students majoring in Animal Science.

A full description of the minor is located in the "University Programs" section of this catalog.

QUANTITATIVE RESEARCH MINOR

The Quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Animal Science. A full description of this minor is included in the "University Programs" section of this catalog.

CORE COURSES FOR MAJOR *

(Required of all students)

Feeds & Feeding	AS	101	(4)
Animal Agricultural Science	AS	111	(4)

Select two Management Science Courses

Swine Management Science	AS	122	(4)
Sheep Management Science	AS	123	(4)
Beef Cattle Management Science	AS	131	(4)
Dairy Cattle Management Science	AS	150	(4)
Poultry Management Science	PS	131	(4)
Dairy Goat Management Science	AS	126	(4)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

† Meat Science	AS	227	(3)
or			
Meat Utilization	AS	327	(4)
Applied Animal Feeding	AS	303	(4)
Animal Breeding	AS	404	(4)
Reproductive Physiology of Food Animals	AS	414	(4)
or			
Mammalian Endocrinology	AS	412	(4)
Senior Project	AS	461	(2)
and			
Senior Project	AS	462	(2)
or			
Livestock Management Systems	AS	464	(5)
Problem Solving Methodology			
Undergraduate Seminar	AS	463	(2)
Animal Diseases	VS	301	(3)
Animal Parasitology	VS	302	(4)
Anatomy & Physiology of Domestic Animals	VS	350	(4)
Anatomy & Physiology of Domestic Animals	VS	351	(4)

† Except Equine Industries

OPTION COURSES FOR MAJOR *

(Required in specific options)

PRE-VETERINARY SCIENCE/GRADUATE SCHOOL

College Chemistry	CHM	105	(3)
College Chemistry Lab	CHM	142	(1)
College Chemistry	CHM	106*	(3)
College Chemistry Lab	CHM	143*	(1)
or			
General Chemistry	CHM	113	(3)
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)
College Physics	PHY	121*	(3)
College Physics	PHY	122*	(3)
College Physics Lab	PHY	141	(1)
College Physics Lab	PHY	142	(1)
Vertebrate Zoology	ZOO	138*	(5)
Embryology	ZOO	414*	(5)
Elem Statistics with applications	STA	120	(4)
Writing for the Professions	ENG	301*	(4)
or			
Report Writing	COM	216*	(4)
or			
Business Communications	COM	218*	(4)

* Required Pre-Veterinary Medicine Courses—U.C. Davis.

Animal Science Electives (4 units) must include one management science course not selected from core.

Support and Directed Courses

(Pre-Veterinary Science/Graduate School)

Elements of Biochemistry	CHM	321	(4)
Trigonometry	MAT	106	(4)
Basic Soil Science	SS	231	(4)
or			
Plant Structures and Functions	BOT	124	(5)
Animal Nutrition	AS	402	(4)
or			
Ruminant Nutrition	AS	403	(4)
Genetics	BIO	303	(4)

ANIMAL AGRI-BUSINESS

Management of Agr. Organizations	ABM	201	(3)
Adv. & Prom. of Agri. Products	ABM	225	(3)
Agricultural Marketing	ABM	304	(3)
Agri. Comm. Mkting & Futures Trading	ABM	305	(3)
Agricultural Financial Analysis	ABM	325	(3)
Agri. Cooperatives	ABM	360	(3)
Computer Appl. for Animal Sci.	AS	428	(3)
Select 8 Units:			
Agri. Sales & Service Mgt.	ABM	202	(4)
Agri. Labor Management Relations	ABM	308	(4)
Agri. Production Economics	ABM	311	(4)
Agriculture Policy	ABM	313	(4)
Introd. to Agri. Data Management	ABM	375	(4)
Select 4 Units:			
World Agri. Resources	IA	101	(4)
Agricultural Ecology	IA	201	(4)
Agricultural Market Development	IA	302	(4)
Agricultural Policy in Dev. Nations	IA	362	(4)
Select 4 Units:			
The Consumer, Marketing & Society	MKT	201	(4)
Principles of Marketing Management	MKT	301	(4)
Marketing Strategy	MKT	302	(4)
Buyer Behavior	MKT	411	(4)
Animal Science Electives			12

(AS 224 & 324 not accepted) Must include one management science course not selected from core.

Support and Directed Courses

(Animal Agri—Business)

Principles of Economics	EC	201	4
Introd. to Computer Systems	CIS	111	4
or			
Microproc. & Computers	AE	251	(3)
Elem. Stat. with Application	STA	120	(4)
Genetics	BIO	303	4
Unrestricted Electives			9-12

ANIMAL MANAGEMENT SCIENCE

Agri. Comm. Mkt. & Futures Trading	ABM	305	(3)
Agri. Labor Relations Management	ABM	308	4
Prin. of Mkt. Animal Evaluation	AS	240	4
Animal Nutrition	AS	402	4
or			
Ruminant Nutrition	AS	403	(3)
Forage Crops	AGR	123	4
or			
Irrigated Pastures	AGR	333	(4)
Approved Animal Science Electives			16

1. (Must include two management science courses not selected from core)
2. AS 224 and AS 324 not accepted

Unrestricted electives 11-15

Support and Directed Courses

College Chemistry	CHM	105	(3)
College Chemistry Lab	CHM	142	(1)
Elem. Organic Chem.	CHM	201	3
Elem. Organic Chem. Lab	CHM	250	1

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Elem. Statistics with App.	STA	120	(4)
Basic Microbiology	MIC	201	5
Basic Soil Science	SS	231	4
Introd. to Comp. Systems	CIS	111	4
or			
Microprocessors & Computers	AE	251	(3)
Genetics	BIO	303	(4)

EQUINE INDUSTRIES

Equine Management	AS	125	(4)
Light Horse & Halter Evaluation	AS	132	(2)
Basic Equitation	AS	124	(3)
Farrier Science	AS	234	(2)
Farrier Science Lab	AS	235	(2)
Horse Industry	AS	325	(3)
Horsemanship	AS	335	(2)
Equine Nutrition	AS	355	(3)
Farrier Problems	AS	434	(3)
Equine Gen. & Breeding Princ	AS	345	(3)
Equine Herd Health Care & Mgt.	AS	365	(4)
Equine Enterprise Management	ABM	329	(3)
Equine Investment Management	ABM	429	(3)
Equine Exercise Physiology	AS	435	(3)
Animal Science Electives			(12)
Unrestricted Electives			(4)

Support and Directed Courses

(Equine Industry Option)

Elem Organic Chem	CHM	201	(3)
Elem Organic Chem Lab	CHM	250	(1)
Basic Soil Science	SS	231	(4)
Elem Statistics with Applications	STA	120	(4)
Introd to Comp Systems	CIS	111	(4)
or			
Microprocessors & Computers	AE	251	(3)
Genetics	BIO	303	(4)
Agricultural Financial Analysis	ABM	325	(3)

General Education

(Required of all Students)

Freshman English I	ENG	104	(4)
Freshman English II	ENG	105	(4)
or			
Report Writing	COM	216	(4)
Advocacy & Argument	COM	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)
Insects & Civilization	AGB	100	(4)
or			
Plants & Civilization	AGR	111	(4)
Basic Biology	BIO	115	(5)
Agricultural Enterprise Mgmt.	ABM	328	(4)
Prin Sociology	SOC	201	(4)
or			
Culture, People and Dress	HE	138	(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)
Personnel Management	ABM	402	(3)
Management Accounting	ABM	324	(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	327	(4)
Approved Animal Science Electives			(5)

Select one management course
Beef Cattle Management Science
Sheep Management Science
Dairy Management Science
Dairy Goat Management Science

Select one management course
Swine management science
Poultry management science
Equine management science

Select 9 units of upper division Approved Animal Science Electives (9)

Course Descriptions

CR/NC courses noted with a †

AS 101 Feeds and Feeding (4) FWSp

An introductory course treating the fundamentals of animal nutrition, the composition of feeds, feeding standards and their application to livestock production. 3 lectures, 1 three-hour laboratory.

AS 111 Animal Agricultural Science (4) FWSp

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 Swine Management Science (4) FW

A study of the swine industry emphasizing the importance of breeds, selection, evaluation, nutrition, breeding principles, disease control, equipment and facilities to ensure scientifically based management decisions.

AS 123 Sheep Management Science (4) FWSp

A study of the sheep industry emphasizing the importance of breeds, selection, evaluation, nutrition, breeding principles, disease control, equipment and facilities to ensure scientifically based management decisions.

AS 124 Basic Equitation (3) FWSp

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 Equine Management Science (4) FWSp

A study of the horse industry emphasizing the importance of breeds, selection, evaluation, nutrition, breeding principles, disease control, equipment and facilities to ensure scientifically based management decisions.

AS 126 Dairy Goat Management Science (4) W

A study of the dairy goat industry emphasizing the importance of breeds, selection, evaluation, nutrition, breeding principles, disease control, equipment and facilities to ensure scientifically based management decisions. 3 lectures, 1 three-hour laboratory.

AS 128 Companion Animal Care (4)

A survey course to familiarize students with the routine problems encountered and the responsibilities involved where leisure time has provided increased incentive to own companion animals for recreational purposes. 4 lectures.

AS 131 Beef Cattle Management Science (4) FWSp

A study of the beef cattle industry emphasizing the importance of breeds, selection, evaluation, nutrition, breeding principles, disease control, equipment and facilities to ensure scientifically based management decisions.

AS 132 Light Horse Halter and Performance Evaluation (2) FWSp

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 Cattle Management Science (4) W

A study of the dairy cattle industry emphasizing the importance of breeds, selection, evaluation, nutrition, breeding systems, disease control, equipment and facilities to ensure scientifically based management decisions.

† AS 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. Graded only on a CR/NC basis.

AS 224 Intermediate Equitation (2) FWSp

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) FW

The prctice of slaughtering and cutting of cattle, sheep and swine. Consideration of chemical composition, yields, grades, federal and state inspection and the fundamenals of curing and smoking meats. 2 lectures, 1 three-hour laboratory.

AS 234 Farrier Science (2) FWSp

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) FWSp

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) W

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) Sp

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) Sp (even years)

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 Applied Animal Feeding (4) FWSp

A study of the nutritional requirements for maintenance, growth, fattening, reproduction and lactation of domestic animals. The use of computerized least-cost formulation of rations to satisfy nutritional requirements. 3 lectures, 1 three-hour laboratory. Prerequisite: AS 101.

AS 305 Artificial Insemination of Domestic Animals (3) W

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 350.

AS 306 Experimental Animal Methodology (4) Sp

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 350 or MIC 201.

AS 318 Livestock Management and the Environment (3) Sp

A consideration of the thermal environment, the biological rhythms, the basis of animal behavior, the relationship between behavior and performance and the environmental aspects of disease in domestic farm animals. 3 lectures. Prerequisite: Junior standing.

AS 320 Animal Production in the Tropics (3) W

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) Sp

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 Commercial Sheep and Wool Production (3) W

Management of range sheep and feedlot operations. Shearing and marketing of wool. 2 lectures, 1 three-hour laboratory.

AS 324 Advanced Equitation (2) FWSp

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) W

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 (4) FWSp

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. 3 lectures, 1 three-hour laboratory.

AS 331 Beef Cattle Science (4) W

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) Sp

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 Evaluation (3) F

Intensive visual evaluation of breeding and market swine, sheep and beef cattle in preparation for intercollegiate livestock judging competition. Extensive training in the preparation and delivery of oral reasons. 3 three-hour laboratories. Prerequisite: AS 241.

AS 345 Equine Genetics and Breeding Principles (3) W

Principles of inheritance for qualitative and quantitative traits. Inheritance of color in the horse. Genetically caused abnormalities; methods of detection of carrier animals. Mare and stallion selection: pedigrees and other types of performance information and their use. Prerequisites: BIO 115, AS 325. 3 lectures.

AS 355 Equine Nutrition (3) Sp

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 365 Equine Herd Health Care and Management (4) F

A study of the etiology, symptomalogy, and control of infectious, nutritional and parasitic diseases of horses. 3 lectures, 1 three-hour laboratory. Prerequisite: AS 325.

AS 375 Equine Riding Instruction (3) W

Development of teaching techniques and theory of efficiently and safely instructing large groups of beginning and advanced riders. 1 lecture, 2 two-hour activities. Pre-requisite AS 124 and AS 224.

† AS 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. Graded only on a CR/NC basis.

AS 402 Animal Nutrition (4) FW

Metabolism of proteins, carbohydrates, fats, minerals, and vitamins. Relationship of proper nutrition to livestock production. 3 lectures, 1 two-hour recitation. Prerequisite: CHM 201, 250, or CHM 314, 317.

AS 403 Ruminant Nutrition (3) Sp

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 201, 250, or CHM 314, 317.

AS 404 Animal Breeding (4) FWSp

Application of genetics to animal breeding. Systems of mating, use of inbreeding, crossbreeding and selection in improving farm animals. 3 lectures, 1 two-hour recitation. Prerequisite: BIO 303.

AS 412 Mammalian Endocrinology (4) FSp

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 350 or equivalent.

AS 413 Physiology of Lactation (3) Sp (odd years)

Physiology of milk secretions. Factors affecting production. Mechanical and natural removal of mammary gland secretions. 3 one-hour lectures. Prerequisite: VS 350 and AS 412 or equivalent.

AS 414 Reproductive Physiology of Food Animals (4) W

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. 1 three-hour laboratory. Prerequisite: VS 350 or ZOO 324, and CHM 321.

AS 424 Nutritive Analysis (2) FWSp

Laboratory course involving the principles and practices in quantitative analysis of feedstuffs. 2 three-hour laboratories. Prerequisite: CHM 201, 250.

AS 427 Meat Processing and Technology (5) Sp

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 428 Computer Applications for Animal Science (3) Sp

A systems course requiring investigation and application of advanced software such as document processing, decision aids, database management, spreadsheets. Statistical analysis and communications in Animal Science. 1 lecture, 2 three-hour laboratories. Prerequisites CIS 111 or AE 251.

AS 432 Advanced Animal Breeding (4) Sp

Advanced principles in animal breeding including selection theory, heterosis, strain line and breed formation. 3 lectures, 1 two-hour recitation. Prerequisite: AS 404.

AS 434 Farrier Problems (3) Sp

Corrective and specialized horseshoeing. Instruction in constructing normal and corrective horseshoes and techniques in applying them. 1 lecture, 2 three-hour laboratories.

AS 435 Equine Exercise Physiology (3) Sp

The basic and applied physiology of the exercising horse. Discussion of muscular respiratory, cardiovascular, nutritional and osmo-regulatory physiology. Includes gait analysis, lameness and pharmacology. 3 Lectures Prerequisite VS 350, VS 351.

† AS 441 Internship in Animal Science (1–16) FWSp

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. Total credit limited to 16 units. Prerequisites: permission of coordinator required in advance. Graded only on a CR/NC basis.

AS 461, 462 Senior Project (2) (2) FWSp

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) FWSp

New methods and developments, practices, and procedures in the field. 2 lectures. Prerequisite: Senior standing.

AS 464 Livestock Management Systems Problem Solving Methodologies (5) FWSp

A systems approach to integrated livestock management. Students utilize their previous learning experience to resolve management problems inherent in the livestock industry using systems-based problem solving methodologies. 3 Lectures, 2—2hr. recitations. Prerequisites AS 111, ABM 324, ABM 328.

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 Management Science (4) FSp

A study of the poultry industry, emphasizing the importance of breeds, selection, evaluation, nutrition, breeding systems, disease control, equipment and facilities to ensure scientifically based management decisions. 3 lectures, 1 three-hour laboratory.

PS 331 Poultry Production (4) W

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 431 Avian Physiology (3) Sp (even years)

Detailed consideration of the physiology of avian species with emphasis on birds of economic importance to man. 3 lectures.

Veterinary Science

VS 301 Animal Diseases (3) FSp

Study of factors contributing to animal diseases and their control. 3 lectures. Prerequisite: MIC 201.

VS 302 Animal Parasitology (4) W

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) Sp

Consideration of the etiology, symptomatology, and control of infectious, nutritional, and parasitic diseases of poultry. 3 lectures.

VS 350 Anatomy and Physiology of Domestic Animals (4) FW

An integrated approach to the structure and function of animal systems. Homeostatic mechanisms will be emphasized. Topics to be covered include the cell, the musculo-skeletal system, the nervous system, and the endocrine system. 3 lectures, 1 three-hour laboratory. Prerequisites: BIO 115, two quarters of chemistry.

VS 351 Anatomy and Physiology of Domestic Animals (4) WSp

A continuation of VS 350. Topics to be covered include the digestive system, the cardiovascular system, the respiratory system, the excretory system, and the reproductive system. 3 lectures, 1 three-hour laboratory. Prerequisite: VS 350.

VS 405 Immunological Procedures in Animal Production (4) Sp

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, 1 three-hour laboratory. Prerequisites: VS 350, 351.

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.

Bonnita M. Farmer, *Chair*

Ruby I. Beilby
Nenita B. Cabacungan
Kara F. Caldwell
Anahid T. Crecelius
Ruthanna Davis
Ramiro C. Dutra
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 (ADA). The department offers a post-baccalaureate Preprofessional Practice Program (AP4) which is approved by the American Dietetic Association. Upon competition of this program or an internship or graduate program, students are eligible to take an examination to become a Registered Dietitian. Students requesting transcript evaluation by the ADA will be required to pay an extra transcript fee of $20 if registered as students or $25 if not currently enrolled.

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.

All Food and Nutrition students are expected to consult regularly with their assigned advisors from the Foods and Nutrition faculty to receive academic and career counseling.

CORE COURSES FOR MAJOR *

(Required of all students)

Introduction to Foods	FN	121	(4)
Meal Management	FN	221	(4)
Nutrition	FN	235	(3)
Nutrition Laboratory	FN	236	(1)
Food Science and Technology	FN	317	(4)
Experimental Food Science	FN	321	(4)
Cultural Aspects of Food	FN	328	(3)
Nutrition of The Life Cycle	FN	335	(3)
Nutrition Education	FN	345	(3)
Community Nutrition	FN	346	(3)
Quantity Food Preparation	FN	351	(4)
Food Procurement	FN	354	(3)
Computer Applications in FN/HE	FN/HE	355	(4)
Food Chemistry and Toxicology	FN	420	(4)
Advanced Nutrition	FN	433	(4)
Advanced Nutrition	FN	434	(4)
Nutritional Assessment-Biochemical	FN	435	(2)
Diet Therapy	FN	443	(4)
Diet Therapy	FN	444	(3)
Institutional Management	FN	452	(3)
Food Service Design	FN	453	(4)
Investigative Process in FN/HE	FN/HE	461	(2)
Senior Project	FN/HE	462	(2)
Undergraduate Seminar	FN/HE	463	(2)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

SUPPORT AND ELECTIVE COURSES

(required of all students)

Genetics	BIO	303	(4)
Elements of Biochemistry	CHM	321	(4)
Food Microbiology	MIC	320	(4)
College Chem	CHM	105	(3)
College Chem Lab	CHM	142	(1)
Elem Org Chem	CHM	201	(3)
Org Chm Lab	CHM	250	(1)
College Algebra	MAT	105	(4)
Basic Microbiology	MIC	201	(5)
Fund of Physics	PHY	102	(4)
Human Physiology	ZOO	235	(4)
Unrestricted Electives			(7)

GENERAL EDUCATION

(Required of all students)

Category I

Freshman English I	ENG	104	(4)
Advocacy & Argument	COM	204	(4)
Freshman English II	ENG	105	(4)
or			
Report Writing	COM	216	

Category II

Category IIA any course (4)

College Chem ..... CHM 104 (3)
College Chem Lab ..... CHM 141 (1)
Basic Biology ..... BIO 115 (5)
Category IID any course ..... (4)

Category III
Arts (A) ..... (4)
Philosphy & History (B) ..... (4)
Literature & Foreign Language (C) ..... (4)

Category IV
Prin of Econ ..... EC 201 (4)
or
Prin of Econ ..... EC 202
Intro to Cult. Anthro ..... ANT 102 (4)
or
Prin of Soc ..... SOC 201

Category IVC any course ..... (4)

Category V
General Psych ..... PSY 201 (4)

Category VI
Amer Civil ..... AMC 201 (4)
or
Intro to Am Govt ..... PLS 201
Am Civil ..... AMC 202 (4)
or
U.S. Hist ..... HST 202

Category VII
Ag Enterprise Mgmt ..... ABM 328 (4)
Personnel Management ..... ABM 402 (4)
Management Accounting ..... ABM 324 (4)

The purpose of the minor in Foods and Nutrition is to help students understand the role that nutrients play in maintaining good health.

FOODS AND NUTRITION MINOR

Introduction to Food Science ..... FN 121 (4)
Meal Management ..... FN 221 (4)
Fundamentals of Nutrition Science .... FN 205 (4)
or
Introduction to Nutrition ..... FN 235
and
Nutrition Laboratory ..... FN 236
Nutrition of the Life Cycle ..... FN 335 (3)
Community Nutrition ..... FN 346 (3)
College Chemistry ..... Chem 104 (3)
College Chemistry Lab ..... Chem 141 (1)
College Chemistry ..... Chem 105 (3)
College Chemistry Lab ..... Chem 142 (1)
Elements of Organic Chemistry ..... Chem 201 (3)
Elements of Organic Chemistry Lab .... Chem 250 (1)
One upper division FN class ..... (3–4)
Total units required ..... (33–34)

PHYSIOLOGY MINOR

The Physiology Minor is an interdisciplinary program which can be elected by students majoring in advising of students in order to facilitate their pursuit of careers in biomedical fields utilizing a knowledge of Physiology. It is particularly appropriate for students majoring in Foods and Nutrition.

A full description of the minor is located in the "University Programs" Section of this catalog.

Course Descriptions

† All courses offered by the department may be taken in a CR/NC basis except for major.

FN 121 Introduction to Food Science (4)

Scientific principles and techniques of food preparation by categories. Elements of food sanitation, legislation, and consumer choices. 2 lectures, 2 three-hour 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 Fundamentals of Nutrition Science (4)

Concepts of nutrition as determined by studies related to macro-nutrients, micro-nutrients, and energy metabolism with emphasis on the requirements of the young adult. Food intake and its relationship to health with attention to cultural diversity and world-wide concerns. Use of the scientific method to assess variety of sources. Computer analysis and written evaluation for individual dietary intake. 4 lecture-problems. For students not majoring in Foods and Nutrition.

FN 210 Principles of Microwave Food Preparation (2)

Principles of the microwave process and its application to food preparation. 1 lecture, 1 three-hour laboratory.

FN 221 Meal Management (4)

Management principles as applied to production of nutritious, economical and palatable meals. Evaluation of time, energy and economic resources as related to meal patterns. 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. Computation of nutritional needs and written dietary analysis. Oral report of selected nutrients. 3 lecture-problems. Prerequisite: CHM 201, 250 or equivalent, ZOO 235. To be taken concurrently with 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: To be taken concurrently with FN 235.

FN 245 Current Issues in the Food Chain (4)

Survey of current issues of health, safety and consumer protection in the production, processing, marketing and consumption of food. Specific food items may be selected to follow through the food chain. 4 lectures—discussion.

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 Science and 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 enology. Field trips. 3 lectures, 1 three-hour laboratory. Prerequisite: MIC 201 or equivalent.

FN 321 Experimental Food Science (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, 1 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. Reading and reporting of current developments in nutrition. 3 lecture-problems. Prerequisite: FN 205 or FN 235, 236.

FN 345 Nutrition Education (3)

Principles of learning and evaluation applied to nutrition. Development of instructional systems, including objectives, learning activities and strategies in school, medical and business settings. Identifications and analysis of current problems inherent in such applications. Discussion and critique of student written and oral reports. 2 lecture-problems; 1 two-hour activity. Prerequisites: FN 205 or FN 235/236.

FN 346 Community Nutrition (3)

Goals and trends in community nutrition. Dietary methodology. National nutrition status surveys. Role of public and private agencies in community nutrition programs. Analytical tools. Grantsmanship, public policy and legislation, 2 lectures, 1 three-hour laboratory. Prerequisites: FN 205 or 235, FN 221, FN 335, FN 345.

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/HE 355 Computer Applications in Foods & Nutrition and Home Economics (4)

Study of issues related to computer-based technologies, terminology, access and capabilities. Selection and use of computer hardware, software and system components in educational settings. 3 lectures, 1 three-hour laboratory.

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)

Methods of sensory evaluation of food products. Applications to quality assurance, technical services and new product development. Written plan to evaluate new and improved food products. 2 lectures, 1 two-hour activity. 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. Update and analysis of current research. Written reports of pertinent publications. 4 lectures—analysis. Prerequisite: CHM 321, FN 235, FN 236, and ZOO 235 or consent of instructor. 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. Update and analysis of current research. Preparation of an extensive annotated bibliography. 4 lecture-problems. Prerequisite: FN 433.

FN 435 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 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. Total credit for each course is limited to eight units. 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. Written reports on modern dietary intervention for selected diseases of hormonal etiology. 3 lectures—analysis. Prerequisite: FN 443.

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.

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. Plan review by industry professionals. 2 lectures, 2 three-hour laboratories. Prerequisite: FN 452.

FN 461/HE 461 Investigative Process in Foods and Nutrition and/or Home Economics (2)

Methods of defining problems and scientific investigations, assessing needs, data gathering and locating resources. Critical thinking involved in the writing of proposals and investigation of integrated issues through written reports based on library research. 2 lectures. Prerequisites: Eng. 104, 105, or Com. 216; senior standing.

FN 462/HE 462 Senior Project (2)

Independent study with approval of advisor. Project may be experimental design, survey research, content analysis, community service, or development of information/technology base. A written report will be submitted. Prerequisite: FN/HE 461.

FN 463/HE 463 Undergraduate Seminar (2)

Student group/committee work on current topics; integrative issues throughout the human life span; oral presentations. Professional practices and ethics, leadership, legislation and public policy, grantsmanship. Prerequisite: FN/HE 462. 2 lectures.

FN 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.

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.

Gaylord P. Patten, *Chair, Plant and Soil Science Department*

Gregory J. Partida, Jr., *Coordinator, Fruit Industries*

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 has as two career options, *Orchard Management Emphasis* and *Fruit Processing and Marketing Emphasis*, which provides students with flexibility to design their academic programs towards their desired professions. The *Orchard Management Emphasis* provides students with both the skills and knowledge of orchard operations, cultural practices and pest management. The scientific and business-oriented background obtained in the *Fruit Processing and Marketing Emphasis* enables the graduate to readily enter the agricultural processing industry.

Both programs provide students with solid backgrounds that allow them to enter very challenging and competitive industries. One of the unique features offered to Fruit Industries students is the opportunity to develop and apply their expertise and knowledge under actual orchard operations. Various species of fruit trees are grown on 110 acres managed by Cal Poly staff. Students are able to do an internship on 53 acres of citrus and avocados located at Pine Tree Ranch in Ventura County. A small packing house and juice pilot plant are located on the campus. A small country store is operated in the packing house in order to provide fresh fruit and produce to the campus community.

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. Several *scholarships* provided by the fruit industry are available to students majoring in Fruit Industries.

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)

Fruit Science Fundamentals	FI	101	(3)
Citrus Production	FI	102	(4)
Avocado Production	FI	201	(4)
Pomology	FI	203	(4)
Diseases of Fruit Trees	FI	226	(4)
Fruit Propagation	FI	245	(1)
Citrus Production	FI	302	(4)
Advanced Pomology	FI	303	(4)
Undergraduate Seminar	FI	463	(2)
Plant Structures and Function	BOT	124	(5)
General Plant Pathology	BOT	323	(4)
Introduction to Arthropods	AGB	165	(4)
Principles of Pest Management	AGB	231	(4)
Insect Pests of Tree & Vine Crops	AGB	229	(4)
Produce Market Quality	AGB	325	(3)

SUPPORT AND ELECTIVE COURSES

Orchard Management Emphasis

FI	461—462	Senior Project	2, 2
or FI	441	Internship in Orchard Management	(12)
AGR	330	Weeds and Weed Control	4
AGB	470	Plant Growth Regulators	3
SS	231	Basic Soil Science	4
SS	233	Soil Fertility and Fertilizers	4
			19 (27)

Directed electives in the following areas to be selected from approved departmental lists with prior consent of advisor:

Agricultural Production and Management (minimum)	15
Diversified Agriculture Supports (minimum)	20
Advanced Agricultural and Biological Sciences (minimum)	7

Fruit Processing and Marketing Emphasis

FI	461	Senior Project	2
FI	462	Senior Project	2
MIC	201	Basic Microbiology	5
BOT	422	Plant Physiology	4
MKT	301	Principles of Marketing Management	4
ABM	304	Agricultural Marketing	3
ABM/IA	360	Agricultural Cooperatives	3
			23

Directed electives in the following areas to be selected from approved department lists with prior consent of advisor:

Agricultural Marketing and Communications (minimum)	24
Advanced Science (minimum)	17

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

GENERAL EDUCATION REQUIREMENTS

Category I: Follow either Pattern 1 or-2

Category II: (Pattern 1)
A. Any Course.....(4)
B. College Chemistry..... CHM 104 (3)
College Chemistry Lab..... CHM 141 (1)
C. Basic Biology..... BIO 115 (5)
D. Any course

Category III:
Select one course from area A, B, and C .....(12)

Category IV:
Select one course from areas A, B and C .....(12)

Category V:
Select one course .....(4)

Category VI
A. American Civilization..... AMC 201 (4)
or
Introduction to American Government ..... PLS 201 (4)
B. American Civilization..... AMC 202 (4)
or
United States History ..... HST 202 (4)

Category VII:
See advisor .....(12)

Course Descriptions

† All courses in Fruit Industries may be taken on a CR/NC basis except by majors.

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 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 Diseases of Fruit Trees (4)

Philosophy of disease control and prevention in California's citrus, avocado, and deciduous fruit and nut orchards. Identification of causal agents, economic impact, critical evaluation of the basic concepts and scientific methodologies involved in control and prevention. 3 lectures, 1 3-hour lab. Prerequisite: FI 103, FI 203, and BOT 323.

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 302 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 3-hour laboratory. Prerequisites: FI 102, FI 226, FI 245.

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. 1 lecture, 2 three-hour laboratories.

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. Letter grade only.

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.

Bonnita M. Farmer, *Chair*

Ruby I. Beilby Jean A. Gipe Ruby L. Trow
Elizabeth K. Tracy

Professional home economists of the future can look forward to an expanding choice of career opportunities in business, industry, education and government. Graduates may begin their careers as a food stylist, preschool teacher, interior designer, consumer affairs officer, home economics teacher or department manager in retail clothing stores. The curriculum also establishes the educational foundations for advancement to higher level positions such as food editor, preschool director/owner, interior design project coordinator, consumer-industry liaison, school administrator and fashion buyer for example.

Home economics majors gain expertise in product knowledge, analytical skills, communication skills, interpersonal skills, technical competencies and organizational skills as applied to the areas of interior design, fashion merchandising, secondary education, early childhood education, foods in business, consumer services and textiles and clothing. Students are also encouraged to gain professional experience through internships. Home economics majors upon entering Cal Poly are always encouraged to work closely with their home economics faculty advisor for academic and career counseling.

Students are encouraged to participate in department extracurricular activities such as Home Economics Club, Phi Upsilon Omicron (honor society in home economics), Poly Vue, Showcase House, and Ag Council, etc. to develop leadership skills, expand professional contacts and continue career exploration.

The California State Credential for secondary school teachers of home economics may be obtained with additional work through the School of Education. Students in Early Childhood Education may qualify as teachers in state licensed preschools by taking coursework in the certificate program in "Early Childhood Education" offered by the department. To ensure quality in the professional preparation and practices of graduate home economists, the American Home Economics Association now certifies professional home economists. The home economics program at Cal Poly qualifies students to apply for this certification.

"Waiver" Program for Home Economics

University programs offering professinal preparation for public school teaching are evaluated by a two-part review. One part is the review of subject matter content and the other is the approval of teacher candidates' professional preparation. Each subject matter major involved in training candidates for single subject teacher certification in the State of California submits a proposed program of subject matter course work to the Commission on Teacher Credentialing. If a subject matter program meets specified criteria, it is granted an examination "waiver". A teacher candidate who does not graduate from one of the State's subject matter "waiver" programs must pass the subject matter portion of the National Teachers Exam or complete the designated "waiver" program of a California college or university to obtain a credential.

Students can satisfy the "waiver" program requirement in Home Economics by completing units as follows: (1) Foods and Nutrition, 12 units, (2) Clothing and Textiles, 12 units, (3) Child and Family, 12 units, (4) Housing, Interiors, and Equipment, 12 units, (5) Consumer Education and Management, 12 units. In addition to the 60 units of required courses, students complete 28 units of courses in closely related subjects chosen in consultation with the Home Economics Teacher Educator.

CORE COURSES FOR MAJOR *

(Required of all students)

Intro to Interior Design and Housing	HE	120	(4)
Art of Dress	HE	137	(4)
Household Equipment	HE	325	(4)
or			
Intro to Textile Science	HE	188	(3)
and			
Intro to Textile Science Lab	HE	189	(1)
Consumerism: the Movement, Its Impact and Issues	HE	245	(4)
Family Resource Management	HE	342	(4)
Computer Applications in FN/HE	FN/HE	355	(4)
Professional Pres. In Home Econ.	HE	390	(3)
Family Housing and Environment	HE	422	(4)
Investigative Process in FN/HE	HE/FN	461	(2)
Senior Project	HE/FN	462	(2)
Undergraduate Seminar	HE/FN	463	(2)
Fundamentals of Nutrition Science	FN	205	(4)
Core Electives (from department list with consent of department advisor)			(28)

SUPPORT and ELECTIVE COURSES

(Required of all students)

Fund of Physics	PHY'	102	(4)
Writing for Professions	ENG	301	(4)
or			
Adv Writing	ENG	303	
Directed electives (from approved dept. list with prior consent of dept. advisor)			(20)
Unrestricted Electives			28-29

Teacher education candidates must take 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.

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

GENERAL EDUCATION

(Required of all students)

Category I
- Freshman English I ..... ENG 104 (4)
- Advocacy & Argument ..... COM 204 (4)
- Freshman English II ..... ENG 105 (4)

Category II
- Any GE Math or Stat ..... (4)
- Consumer Chemistry ..... CHM 101 (4)
  - *or*
- College Chemistry ..... CHM 104
  - and College Chemistry Lab ..... CHM 141
- Basic Biology ..... BIO 115 (5)
- Category II-D any course ..... (4)

Category III
- Any ART or ENV course ..... (4)
- Philosophy & History ..... (4)
- Literature & Foreign Language ..... (4)

Category IV
- Category IV-A from approved dept. list ..... (4)
- Family as a Social Institution ..... SOC 321 (4)
- Category IV-C any course ..... (4)

Category V
- General Psychology ..... PSY 201 (4)

Category VI
- Amer Civil ..... AMC 201 (4)
  - *or*
- Intro to Am Govt ..... PLS 201
- Amer Civil ..... AMC 202 (4)
  - *or*
- U.S. Hist ..... HST 202 (4)

Category VII
- Child Pscyhology: Early Childhood ..... PSY 310 (4)
- The Socially and Culturally Different Child ..... SW 314 (4)

FASHION MERCHANDISING MINOR

This interdisciplinary minor is designed for students who seek careers in the fashion industry. The minor provides students with a background in both fashion as well as business to better prepare them to seek employment in manufacturing or retailing. The minor in Fashion Merchandising is administered jointly by the Departments of Marketing Management and Foods & Nutrition/Home Economics.

The attainment of a minor in fashion merchandising is accomplished by appropriate selection, timely scheduling and satisfactory completion of specifically designated courses and electives totaling a minimum of 36 quarter units as outlined below:

Completion of the following courses is required:
- Art of Dress ..... HE 137 (4)
- Fashion Merchandising ..... HE 474 (4)
- Inst for Int Ag Trade & Dev ..... IA 301 (4)
- Principles of Marketing Mgmt ..... MKT 301 (4)
- Marketing Internship ..... MKT 441/2 (4)
- Select two courses from Group A ..... (8)
- Select two courses from Group B or C ..... (8)

GROUP A
- Intro to Cloth Construction ..... HE 130 (4)
- People, Culture, and Dress ..... HE 138 (4)
- Visual Merch: Cloth and Int ..... HE 475 (4)

GROUP B
- Professional Selling ..... MKT 208 (4)
- Retail Management ..... MKT 308 (4)
- Retailing Problems ..... MKT 447 (4)

GROUP C
- Intro to International Bus ..... MHR 332 (4)
- International Marketing Mgmt ..... MKT 414 (4)
- Intl Mktg of Food & Fiber Products ..... IA/ABM 330 (4)
- Strategy in Intl Marketing ..... MKT 415 (4)

HOME ECONOMICS MINOR

The home economics minor will provide students with a general broad base in the five discipline areas of home economics: textiles/clothing, foods/nutrition, housing/interiors/equipment, management/finance/consumerism, and child/family relations. This minor is available to EDUC students seeking an additional teaching authorization and is valuable to those students seeking employment with businesses that sell or provide consumer goods or services.

- Intro to Cloth Construction ..... HE 130 (4)
  - *or*
- Cloth Constr Theory I * ..... HE 131
  - *or*
- Cloth Constr Theory II ** ..... HE 132
- Intro to Food Science ..... FN 121 (4)
- Fundamentals of Nutrition Science ..... FN 205 (4)
- Early Child. Prin. and Pract.: Preschool ..... HE 215 (4)
  - *or*
- Early Chldhd Programs & Activities: Preschool *** ..... HE 315
- Consumerism: The Movement, Its Impact and Issues ..... HE 245 (4)
- Intro to Interior Design and Housing ..... HE 120 (4)
  - *or*
- Family Housing & Environment ..... HE 422 (4)
- Family Resource Management ..... HE 342 (4)
  - *or*
- Household Equipment ..... HE 325
- Curriculum in Consumer & Hmkg, Educ. ..... HE 454 (3)
  - *or*
- Home Ec Educ Methods ..... TPC 434
  - *or*
- HE/FN elective .....

(31–32)

* Prerequisite: HE 130 or consent of instructor.

** Prerequisite: HE 131 or consent of instructor.

*** Prerequisite: HE 215 or consent of instructor.

COSTUME TECHNOLOGY MINOR

This minor is designed for students who seek careers in costume construction for theatre, opera, ballet and other dance forms, or movie and television productions. A knowledge of costume history, color, textiles and methods

of pattern drafting and costume construction must be coupled with an insight into the theatre arts and stage design. Upon completion, students may pursue careers as costumers, costume technicians, wardrobe supervisors, drafters or other related positions in costume manufacturing and retailing.

Acting	DR	151	(4)
Intro to Theatre*	DR	203	(4)
Cloth Constr Theory I **	HE	131	(4)
or			
Cloth Constr Theory II ***	HE	132	
or			
Tailoring Principles**	HE	430	
Art of Dress	HE	137	(4)
or			
Culture, People and Dress	HE	138	
Intro to Textile Science	HE	188	(4)
Pattern Drafting in Cloth Constr**	HE	330	(4)
Stage Cost Design & Constr	DR	381	(4)
History of Costume	DR	481	(4)
Advanced Proj in Theatre****	DR	441	(2)
Approved Upper Division Clothing Elective			(2)
			(36)

* Prerequisite: ENG 104 or consent of instructor.

** Prerequisite: HE 130 or consent of instructor.

*** Prerequisite: HE 131, 132 or 430 or consent of instructor.

**** To be filled by a minimum of two costume crew assignments on two separate productions.

EARLY CHILDHOOD EDUCATION CERTIFICATE

To teach in private state licensed preschools a student must complete 18 quarter units of course work in early childhood education/child growth and development for partial fulfillment of teacher requirements under Title 22 of the State of California—Health & Welfare Agency, Department of Social Services. To teach in government funded preschools a student must complete 36 units of course work in the same areas for partial fulfillment of the Children's Center Instructional Permit requirements from the State Commission for Teacher Preparation and Licensing.

Choose 36 units from the following:

Foundations of Early Childhood Education	HE/PSY	110	(4)
Early Childhood Principles and Practices: Infant & Toddler	HE	214	(4)
Early Childhood Program and Activities: Infant & Toddler	HE	314	(4)
Early Childhood Principles and Practices: Preschool	HE	215	(4)
Early Childhood Program and Activities: Preschool (Prerequisite: HE 215)	HE	315	(4)
Org & Mgmt of Preschool Prog (Prereq: HE 315)	HE	415	(4)
Child Psych: Early Childhood (Prereq: PSY 201 or 202)	PSY	310	(4)
Child Lit (Prereq: 200-level Lit course)	ENG	324	(4)
Dev Mov for Child	PE	328	(3)
Soc & Cult Diff Child (Prereq: Consent of Instructor)	SW	314	(4)
Music Lit for Child (Prereq: Upper div. standing)	MUS	401	(4)
or			
Other approved elective			
Total units required			36

Students interested in owning/operating a private preschool under Title 22 would benefit from taking the following Business/Management Emphasis:

Financial Acctg	ACC	124	(4)
or			
Mgmt Acctg	ABM	324	(4)
Legal Env of Bus Org	FRL	302	(4)
Personnel Mgmt	ABM	402	(4)
Starting Your Own Business	MHR	204	(4)

Students interested in seeking a Supervision Permit for directing a government funded preschool from the State Commission for Teacher Preparation and Licensing should seek advisement from the home economics faculty.

Course Descriptions

† All courses offered by the department may be taken on a CR/NC basis except for majors.

HE 110/PSY 110 Foundations of Early Childhood Education (4)

An introduction to the fundamental principles of child growth and development as they have influenced the development of the field of early childhood education. Current trends and issues in child growth and development and early childhood education concerning the child in the family and community. Two lecture hours, two 2-hour arranged activities involving participation in local children's centers.

HE 120 Introduction to Interior Design and Housing (4)

Color, design, materials and organization of space as applied to the aesthetics of interiors. Relationship of interiors to exteriors of homes. Experimental application of theories. 3 lectures, 1 three-hour laboratory.

HE 130 Introduction to Clothing Construction (4)

Evaluation of techniques and equipment used in construction of woven and knitted fabrics. Recommended for students with limited previous sewing experience. 2 lectures, 4 hours activity.

HE 131 Clothing Construction Theory I (4)

Evaluation of intermediate techniques and equipment used in construction of woven and knitted fabrics. 2 lectures, 4 hours activity. Prerequisite: HE 130 or consent of instructor.

HE 132 Clothing Construction Theory II (4)

Evaluation of advanced techniques and equipment used in construction of woven and knitted fabrics. 2 lectures, 4 hours activity. Prerequisite: HE 131 or consent of instructor.

HE 137 Art of Dress (4)

Study of classical art principles and aesthetic ideals as applied to clothing design and human body design through written analysis projects. Use of aesthetic, functional and structural design factors in making clothing design choices for artistic self-expression. 4 lecture-problems.

HE 138 Culture, People, and Dress (4)

Study of the interrelatedness of socio-psychological, economic and political/religious influences on dress in historical perspective. Cross-cultural analysis and interpretation of Western and non-Western clothing behavior through written analysis papers. 4 lecture-analysis hours.

HE 188 Introduction to Textile Science (3)

Introductory study of the chemical and physical properties of textile fibers, dyes and finishes; fabric geometry including yarn and fabric structure; methodologies for evaluating textile properties and performance; textile products as represented by technologies of diverse cultures. 3 lectures.

HE 189 Introduction to Textile Science Laboratory (1)

Introduction to experimental techniques, laboratory testing equipment, and evaluation for the analysis of fibers and fabrics. 1 three-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 214 Early Childhood Principles and Practices: Infant/Toddler (4)

Application of principles of child growth in the development of infants' and toddlers' socio-psychological, intellectual and physical self; observation and participation in local children's centers. 2 lectures, 2 three-hour arranged laboratories. Prerequisite: HE 110/PSY 110 or consent of instructor.

HE 215 Early Childhood Principles and Practices: Preschool (4)

Application of principles and concepts of child growth in the development of the preschool age child's socio-psychological, intellectual and physical self; observation and participation in local children's centers. 2 lectures, 2 two-hour arranged activities. Prerequisite: HE/PSY 110 or consent of instructor.

HE 220 Interior Design and Furnishings I (4)

Product information on furnishings, textiles, accessories, and architectural materials related to interior design. Discussion and application or investigation of common interior design problems such as window and wall treatments, flooring and furniture selection, etc., based on individual and family needs. 3 lectures, 1 three-hour laboratory. Prerequisite: HE 120 or consent of instructor.

HE 228 Interior Design Portfolio Techniques (4)

Introduction to equipment used in developing professional interior design presentations. Selection and application of appropriate tools and techniques in developing such projects as floor plans, details, color boards, material layouts, models and portfolios. Prerequisite: HE 120 or consent of instructor. 2 lectures, 4 hours activity.

HE 245 Consumerism: The Movement, It's Impact and Issues (4)

Analysis of the role of consumption in economic systems. The consumer movement past, present and future viewed as a response to economic and social conditions. Contemporary consumer issues, information sources, legislation and protection. 4 lecture-problem hours.

HE 285 History of Textile Art (4)

Comprehensive survey and analysis of the development of textile art in Western civilizations from prehistoric times to the 20th century. 4 lecture-analysis hours.

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 314 Early Childhood Programs and Activities: Infant/Toddler (4)

Examination of early childhood programs and methods; activities including the areas of arts and crafts, social studies, rhythmic and large muscle movement, language and literature, health, safety and nutrition; participation in local preschool programs. 2 lectures, 2 two-hour arranged activities. Prerequisite: HE 214 or consent of instructor.

HE 315 Early Childhood Programs and Activities (4)

Examination of early childhood programs, and methods; creative activities including the areas of arts and crafts, science, social studies, rhythmic and large muscle movement, language and literature, math, music, health and safety; participation in local preschool programs. 2 lectures, 2 two-hour arranged activities. Prerequisite: HE 215 or consent of instructor.

HE 320 Interior Design and Furnishings II (6)

The application of space planning and lighting principles in residential and non-residential interiors. Solutions to problems regarding the relationship of functional and aesthetic requirements. Prerequisite: HE 220 or consent of the instructor. 3 lectures, 6 hours activity.

HE 325 Household Equipment (4)

Current developments and features in major and small appliances used in the home. Uses, selection, installation and care of household equipment. 3 lectures, 1 three-hour laboratory.

HE 329 Applied Interior Design Techniques (2)

Resources, materials, styles, estimates and construction of draperies, reupholstery, bed coverings and home accessories. Application of methods and materials in student projects. Preparation for the professional interior designer. 2 lecture-problems. Prerequisite: HE 120 or consent of instructor.

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 131, or HE 132, or consent of instructor.

HE 342 Family Resource Management (4)

Introductory study of the economic, social and institutional forces that influence management of homes, families and individuals. Application of management principles in use of time, energy and other resources to achieve family, personal and career goals. Simulation of problem solving models. 4 lecture-problems.

HE 343 Family Resource Management Practicum (4–12)

Residency setting for students to apply the management process to varying simulated living situations. Study of the effects of management on quality of life, maximization of resources, decision making, interpersonal and communication skills. 2 lectures, 2 three-hour labs. Maximum credit of 4 units per quarter. Prerequisite: HE 342 and permission of department coordinator required in advance.

HE/FN 355 Computer Applications in Foods & Nutrition and Home Economics (4)

Study of issues related to computer-based technologies, terminology, access and capabilities. Selection and use of computer hardware, software and system components in educational settings. 3 lectures, 1 three-hour lab.

HE 390 Professional Presentation Techniques (3)

Techniques and methods used in making professional written and oral presentations and demonstrations in the subject areas of home economics and foods and nutrition for live or video-tape audiences. 2 lectures, 1 three-hour lab.

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. Participation in local preschools. 3 lectures, 1 three-hour arranged laboratory. Prerequisite: HE 315, or consent of instructor.

HE 420 Interior Design and Furnishings III (4)

Product information, selection, specification and installation of counters, cabinetry, equipment and ventilation systems with an emphasis on kitchens and baths. Prerequisites: HE 120 and 220 or permission of the instructor. 2 hours lecture, 4 hours activity.

HE 422 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. Written and oral analysis of family housing problems. 4 lecture-problems.

HE 423 Historical Interiors I (4)

Historical development of interiors from Ancient times through the Renaissance. Trends of furniture, textiles and other furnishings; influence of culture, politics and society. Adaptation of historical furnishings and interiors for today's market. 3 lectures, 1 three-hour laboratory.

HE 424 Historical Interiors II (4)

Historical development of interiors from Baroque to today. Trends of furniture, textiles, and other furnishings; influences of culture, politics and society. Adaptation of historical furnishings and interiors for today's market. 3 lectures, 1 three-hour laboratory.

HE 427 Commercial Interiors (3)

Application of information related to the selection, use and care of materials to the design of hotel, restaurant, and institutional and other public interiors. Students select design problem and investigate product availability, design, purchase, installation and maintenance alternatives. 3 lecture-problems.

HE 429 Professional Practices for Interior Designers (3)

Client and designer responsibilities. Consultations and fees, business forms, record keeping, resources and materials, freelance opportunities and public relations. Written analysis of professional problems interior designers encounter. 2 lectures, 1 two hour activity. Prerequisite: HE 120 or consent of instructor.

HE 430 Tailoring Principles (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 440 Family Financial Behavior (4)

Impact of family financial decisions on lifestyle choices and coping behavior throughout the family life cycle. Emphasis on professional counseling for financial responsibility. Preparation of financial plans and analysis of investment opportunities. 4 lecture-problems.

HE 441, 442 Internship in Home Economics (1–8) (1–8)

Supervised work related experience in home economics at the professional level in education, business and industry helpful to career exploration and future employment. Experiences may be useful for preparation of senior projects. 40 hours of work experience equals one unit of credit. Prerequisite: permission of faculty required in advance.

HE 443 Management Skills for the Aged and Handicapped (3)

Special management skills needed by 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 arranged laboratory. Prerequisite: HE 342 or consent of instructor.

HE 452 Evaluation in CHE/HERO Programs (3)

Selection of evaluation devices, planning and constructing measuring instruments, and interpretation of test results. Program evaluation, validation and assessment of teaching effectivenss, and design of compentency-based outcome measures. 3 hours lecture-problem solving.

HE 453 Home Economics Career Preparation Programs (4)

Development of career preparation or training programs and criteria for selection of participants. Analysis of required employment skills. Simulated work experience and advisory committee participation. Program management and critiques, written career analysis. 4 lecture-problem hours. Prerequisite: upper division standing.

HE 454 Curriculum in Consumer and Homemaking Education (3)

Curriculum design and evaluation; development of a rationale, instructional objectives, assessment measures, learning activities and content generalizations, writing and critiquing learning packages and planning strategies for individualized instruction. 3 lecture-problems.

HE 455 Family Life and Parenting Education (3)

Development and implementation of educational programs in family living, parenthood education, and child guidance. Role expectations and elimination of sex stereotyping; special needs of family members including single parents; cultural diversity, societal interactions and reaction to crisis & change. 3 lectures.

HE/FN 461 Investigative Process in Foods and Nutrition and/or Home Economics (2)

Methods of defining problems and scientific investigations, assessing needs, data gathering and locating resources. Critical thinking involved in the writing of proposals and investigation of integrated issues through written reports based on library research. 2 lectures. Prerequisites: Eng. 104, 105, or Com. 216; senior standing.

HE/FN 462 Senior Project (2)

Independent study with approval of advisor. Project may be experimental design, survey research, content analysis, community service, or development of information/technology base. A written report will be submitted. Prerequisite: FN/HE 461.

HE/FN 463 Undergraduate Seminar (2)

Student group/committee work on current topics; intergrative issues throughout the human life span; oral presentations. Professional practices and ethics, leadership, legislation and public policy, grantsmanship. Prerequisite: FN/HE 462.

HE 474 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. Oral and written findings on current topics relevant to careers. 4 lecture-problems. Prerequisite: upper division standing.

HE 475 Visual Merchandising: Clothing and Interiors (4)

In-store and window display, illustration, fashion presentations and special events as related to merchandising fashion and interiors. The use of color, design and technological innovations for visual merchandising. Written analysis and presentation. 4 lecture-problems. Prerequisite: HE 474.

HE 488 Textile Science (4)

Theoretical analysis of textile structures. Assessment of current research and development 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.

HE 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 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 majors offered in the agricultural business management/agricultural education department is international agriculture. For other programs offered in the department, see agricultural business management and agricultural education.

David C. Whaley, *Chair*

Edison I. Cabacungan, William C. Hughes, Arthur F. Parker, A. Reza Hoshmand, Marvin L. Klein, James M. Weidman

The Bachelor of Science degree program in International Agriculture offers two areas of emphasis, namely, International Agricultural Business Management and International Agricultural Development.

The curriculum with emphasis in International Agricultural Business Management is designed for students who are interested in pursuing careers related to agri-business in international commerce. With a substantial proportion of agricultural products being traded in international markets there is a need for graduates who are knowledgeable in such activities as exporting and importing, advertising and promotion, banking and finance, and other aspects of international business involving agricultural products.

The emphasis in International Agricultural Development prepares students for work in developing nations. Graduates of this program may find opportunities with voluntary and church related agricultural development programs such as the Peace Corps, International Voluntary Services, agricultural missions, research and development programs with the U.S., U.N., or philanthropic organizations, and various agencies of the U.S. Government like the U.S. Department of Agriculture, U.S. Department of Commerce and the State Department.

Both emphases require 12 units of foreign language or demonstrated comparable proficiency in a foreign language to enable graduates to perform their tasks more effectively overseas.

Both programs also prepare students for further studies in graduate schools of business, as well as agricultural and economic development.

Students are encouraged to work and travel abroad as part of their program. Each student may arrange credit for experiences such as service with the Peace Corps, international exchange programs, and internships overseas. Opportunities also exist for qualified students to study overseas under the International Program of the California State University System.

An increase in demand for graduates knowledgeable in the production, distribution and marketing of agricultural commodities can be expected due to the increasing pressures of a growing world population and shortage of food, especially in lesser developed nations.

CORE COURSES FOR MAJOR*

(Required of all students)

Global Resources for Food	IA	101	(4)
Ag Ecology	IA	201	(4)
Inst for Int Ag Trade & Dev	IA	301	(4)
Ag Mkt Development	IA	302	(4)
Ag Coops	IA/ ABM	360	(3)
Ag Pol Dev Ntns	IA	362	(4)
Senior Project	IA	461	(2)
Senior Project	IA	462	(2)
Undergrad Seminar	IA	463	(2)
Intro Ag Business	ABM	101	(4)
Mgmt Acctg	ABM	324	(4)
Financial Analysis	ABM	325	(4)
Ag Data Mgmt	ABM	375	(4)

Additional Courses for Int Ag Bus Mgmt Emphasis

Intro to Ag Business	ABM	101	(4)
Calif. & Wrld Ag	ABM	300	(4)
Ag Economics	ABM	311	(4)
Ag Policy	ABM	313	(4)
Ag Ent Mgmt	ABM	328	(4)
Ag Ent Accounting	ABM	340	(4)
Personnel Mgmt	ABM	402	(4)
Trans Ag Commod	ABM	416	(3)
Quant Analysis for Ag	ABM	476	(4)
Legal Env Bus Transactions	FFL	201	(4)
Int Mktg Food and Fiber Prod	IA	330	(3)

Additional Courses for Development Emphasis

Ag Lan/Proj Plan	IA	303	(4)
Water Resource Utilization	IA	350	(3)
Seminar Tropical Ag	IA	371	(2)
Farm Mgmt Low Income Ag	IA	380	(3)
Rural Comm Development	IA	382	(3)
Intro. Plant Science	AGR	111	(4)
Cont. Aspects of Nutrition	FN	205	(4)
Env., Tech. and Culture	ANT	350	(4)
Political Development	PLS	342	(4)
or			
Planning in Developing Nations	URP	475	

SUPPORT AND ELECTIVE COURSES FOR IA MAJOR

Foreign Language ..... (8)*

Additional Courses for Int Ag Bus Mgmt Emphasis

Intro to Bus Fin II	FRL	305	(4)
Multintnl Fin Mgmt	FRL	453	(4)
Policy in Mgmt	OM	422	(4)
Prin of Econ	EC	202	(4)

Directed electives, Int Ag Bus Mgmt Emphasis (advisor and departmental approval) ..... (10)

Additional Courses for Development Emphasis

Basic Soil Sci	SS	231	(4)
Intro to Arthropods	AGB	165	(4)
Animal Prod Tropics	AS	320	(3)

Directed electives Int Ag Development Emphasis to include

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

min of 20 units of ag prod or nutrition (advisor and departmental approval) ..... (25)
Unrestricted electives ..... (0-21)

* 12 units are required: 8 are in support courses and 4 in G.E. Category IVc. Students with foreign language competency see advisor.

GENERAL EDUCATION

Category I
- a. Freshman English I ..... ENG 104 (4)
- b. Advoc & Argmt ..... COM 204 (4)
- c. Report Writing ..... COM 216 (4)

Category II
- a. Elem. Statistics w/Applic ..... STA 120 (4)
- b. Select one course from approved list ..... (4)
- c. Select one course from approved list ..... (4)
- d. Select one course from approved list ..... (4)

Category III
- a. Select one course from approved list ..... (4)
- b. Bus & Prof Ethics ..... PHL 205 (4)
- c. Select one course from approved list ..... (4)

Category IV
- a. Prin of Econ ..... EC 201 (4)
- b. Intro to Cultural Anthro ..... ANT 102 (4)
- c. Select one course from approved list ..... (4)

Category V
- General Psychology ..... PSY 201 (4)

Category VI
- a. Amer Civ ..... AMC 201 (4)

or
- Intro to Amer Govt ..... PLS 201 (4)

- b. Amer Civ ..... AMC 202 (4)

or
- U.S. History ..... HST 202 (4)

Category VII

See departmental advisor

INTERNATIONAL AGRICULTURE MINOR

Global Resources for Food	IA	101	(4)
Int Mrktg Food & Fiber Prod	IA/ ABM	330	(3)
Ag Policy in Dev Ntns	IA	362	(4)
Select 22 units from following:			
Ag Ecology	IA	201	(4)
Inst for Int Ag Trade & Dev	IA	301	(4)
Ag Mkt Dev	IA	302	(4)
Ag Land & Proj Planning	IA	303	(4)
Ag Water Res. Utiliz	IA/ ABM	350	(3)
Ag Coops	IA/ ABM	360	(3)
Sem in Tropical Ag	IA	371	(1-2)
Farm Mgmt Low Inc Trop Ag	IA	380	(3)
Field Exp in Latin Amer	IA	401	(3-8)
California and World Agriculture	ABM	300	(4)
Ag Mktg	ABM	304	(3)
Ag Policy	ABM	313	(4)
Mgmt Acctg	ABM	324	(4)

Course Descriptions

† All courses offered by the department may be taken on a CR/NC basis except for majors.

IA 101 Global Resources for Food (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 humans 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 Institutions for International Agricultural Trade and Development (4)

Analysis and comparison of corporate, cooperative, philanthropic, and governmental food, fiber and agricultural institutions affecting international agricultural trade and development. 4 lectures.

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 (4)

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. 4 lectures. Prerequisite: ABM 325 or permission of instructor.

IA/ABM 330 International Marketing of Food and Fiber Products (3)

Marketing of food, fiber, and horticultural products in foreign markets. Special emphasis on selecting export markets, procedures for establishing contacts, promotion, financing, insuring, shopping tariffs, customs, regulations and other matters related to food and fiber products. Management practices and problems of firms involved in exporting and importing textiles and garments, livestock, fruits, vegetables, grains and other food and fiber products. 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 441, 442 Internship in International Agriculture (1–3), (1–3)

On-the-job training in international agriculture providing collegiate level experience in international agricultural development or trade. 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.

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

Frank D. Gibbons III, *Chair*

Joel W. Carter
Dale R. Christiansen
James L. Degen
Terrance Fujimoto
Kent Kurtz
Peggy S. McLaughlin
Raymond Orton
Frederick Roth
Donna Wallace

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 popularity 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 an 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, as well as the field of landscaping, contracting and maintenance.

The 1400-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 student helpers. The staff carries on the work started by classes and operates a commercial retail and wholesale nursery. 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. The directed electives provide the student with an opportunity to select a concentration in floriculture, graduate school preparation, horticulture teaching, landscape contracting, nursery management, turfgrass management, horticultural therapy or irrigation design. The latter gives the student a minor in irrigation design to supplement the ornamental horticulture major. The combination provides excellent preparation for careers in landscape irrigation.

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)
Landscape Horticulture Principles and Practices	OH	131	(4)
Horticultural Production Practices	OH	132	(3)
Nursery Management	OH	224	(4)
or			
Flower Shop Operations	OH	227	
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)
Plant Materials for Interiors	OH	230	(3)
or			
Sub-Trop Plant Materials	OH	335	
or			
Native Plant Materials	OH	336	
Practicum	OH	400	(4)
Diseases of Ornamental Plants	OH	427	(4)
Landscape Management	OH	443	(4)
or			
Specialized Ornamental Plant Production	OH	435	
Senior Project	OH	461	(2)
Senior Project	OH	462	(2)
Undergraduate Seminar	OH	463	(2)
Landscape Drafting Fundamentals	PA	211	(4)
Arboriculture	PA	328	(3)
Turf Management	PA	333	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Introduction to Arthropods	AGB	165	(4)
Plant Structure and Function	BOT	124	(5)
Plant Pathology	BOT	323	(4)
Plant Physiology	BOT	422	(5)
College Chemistry	CHM	105	(3)
College Chemistry Lab	CHM	142	(1)
Basic Soil Science	SS	231	(4)
Soil Fert. & Fertilizers	SS	233	(4)
Soil Materials	SS	439	(3)
Free Electives			(12)
Directed Electives			(22)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

General Education

(Required of All Students)

Category I
Communications in the English Language
Freshman English I ..... ENG 104 (4)
Freshman English II ..... ENG 105 (4)
or
Report Writing ..... COM 216
Advocacy and Argument..... COM 204 (4)

Category II
Science and Mathematics Area A
College Algebra ..... MAT 105 (4)

Area B
College Chemistry ..... CHM 104 (3)
College Chemistry Lab..... CHM 141 (1)

Area C
Basic Biology..... BIO 115 (5)

Area D
Any course on list .....(4)

Category III
Art, Literature, Philosophy, and Foreign Language
A. Arts
The History of Garden Art ..... PA 214 (4)
B. Philosophy and History
Any course on list B. .....(4)
C. Literature and Foreign Languages
Elementary Spanish I ..... FL 151 (4)

Category IV
Social Sciences
A. Economic
Ag Enterprise Mngt..... ABM 328 (4)
B. Social
Any course on list .....(4)
C. Political and Historical
Any course on list .....(4)

Category V
The Integrated Being
General Psychology ..... PSY 201 (4)

Category VI
U.S. History, Constitution, and American Ideals
American Civilization..... AMC 201 (4)
or
Intro to American Government ..... PLS 201
American Civilization..... AMC 202 (4)
or
U.S. History..... HST 202

Category VII
Upper Division
Mngt Acct ..... ABM 324 (4)
Personnel Mngt..... ABM 402 (4)

ORNAMENTAL HORTICULTURE MINOR

(Required of all students)
Landscape Horticulture Principles and Practices ..... OH 131 (4)
Greenhouse Management ..... OH 323 (4)
or
Landscape Management ..... OH 443 (4)
Diseases of Park Plants ..... PA 327 (4)
Arboriculture..... PA 328 (3)
Plant Materials I, Trees ..... OH 231 (4)
Plant Materials II, Shrubs & Vines ..... OH 232 (4)
or
Plant Materials III, Herbaceous..... OH 233 (4)
Athletic Turf Management..... PA 332 (3)

COURSE DESCRIPTIONS

All courses offered by the department may be taken on a CR/NC basis except for majors.

OH 100 Introduction to Ornamental Horticulture (2) FW

An introduction to the Ornamental Horticulture major with emphasis on career opportunities in the field, curriculum choices and planning for the student, procedures in departmental and university operations. 2 lectures. Required for all OH majors. Must be taken within three quarters of entrance to major. Graded on a CR/NC basis only.

OH 120 Interior Plants and Flowers (2)

A study of houseplants. 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 Landscape Horticultural Principles and Practices (4) FWSp

An introduction to the fundamental skills and principles of plant growth in the landscape. Includes planting techniques, pruning, staking, home vegetables and fruit production. 3 lectures, 1 three-hour laboratory.

OH 132 Horticultural Production Practices (3) WSp

Methods and principles of ornamental plant production including propagation by seed, spore, cuttings, budding and grafting. Horticultural equipment and structures related to plant production. Transplanting, potting, canning, shifting of nursery stock. 2 lectures, 1 three-hour laboratory. Prerequisites: OH 131 or consent of instructor.

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. Graded on a CR/NC basis only.

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 the theory of the basics of floral design to include principles and elements of design. Color theory, preparation, and care of flowers. The laboratory is for the applied construction of these theories. 1 lecture, 2 three-hour laboratories.

OH 224 Nursery Management (4) W

Legal aspects and economics of operating a commercial retail or wholesale nursery. Federal, state and local regulations. Quality and inventory control, shipping practices, credit management. Site selection, nursery layout, supply purchasing, advertising related to the nursery business. 3 lectures, 1 three-hour laboratory. Prerequisites: OH 131, 132.

OH 227 Flower Shop Operation (4)

Familiarizes the student with flower shop ownership. Course relates personnel management, merchandising, salesmanship, advertising, wholesale and retail buying, and accounting to the operation of a flower shop. 3 lectures, 1 three-hour laboratory. Prerequisite: OH 223 or consent of instructor.

OH 230 Plant Materials for Interiors (3)

An intense study of plant materials suitable for use in interior landscaping. Plants used indoors from large tree specimens to low-growing ground covers will be described according to growth habit, cultural requirement, and use in the interior landscapes. 2 lectures, 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.

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.

OH 233 Plant Materials III—Herbaceous (4) Sp

A study of herbaceous plants—bedding plants, groundcovers, and non-woody 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.

OH 241 Creative Floral Design (3)

A study of abstracts using line, space, color, and other design principles to create an artistic floral arrangement. 1 lecture, 2 three-hour laboratories.

OH 253 Residential Horticulture (4)

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. Graded on a CR/NC basis only.

OH 410 Advanced Floral Design (4)

Principles of advanced floral design for weddings, including but not limited to floral decorations to wear and carry, decoration of churches and other areas used for weddings, receptions, both formal and informal. 2 lectures, 2 three-hour laboratories. Prerequisites: OH 223 or consent of instructor.

OH 411 Advanced Floral Design—Sympathy and Special Occasions (4)

Techniques in the design and arrangement of all types of funeral flowers including customs and family traditions. Innovative ideas will be stressed for special occasions including stage decorations, banquets, birthdays and holidays. 2 lectures, 2 three-hour laboratories. Prerequisites: OH 223 or consent of instructor.

OH 422 Advanced Plant Propagation (4)

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 Specialized Ornamental Plant Production (4)

Controlling production of commercial horticultural crops such as cut flowers, foliage plants, bedding plants and flowering container plants. Use of photoperiod, temperature adjustment, vernalization and chemicals to schedule maturity of a crop. 3 lectures, 1 three-hour laboratory. Prerequisites: OH 131, 132, 323, SS 231, 233 and BOT 124.

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. 2 lectures, 1 three-hour laboratory. Prerequisite: OH 427 and SS 231 or consent of instructor.

OH 441 Interior Landscape Management (3)

An intensive study of interior landscaping in shopping malls, offices, and other interior spaces. The plants used, the proper maintenance and management including cultural practices, scheduling, chemicals and cost analysis. Operational practices of interior landscape firms. 2 lectures, 1 three-hour laboratory. Prerequisites: OH 131, 230 or consent of instructor.

OH 443 Landscape Management (4)

The techniques necessary for the proper maintenance of turf, trees, shrubs, and other ornamental plants used in landscaping of parks, streets, and institutional grounds. Emphasis is on scheduling, personnel training, and cultural practices. Proper use of equipment, chemicals, and cost analysis. 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 461 grade only.

OH 463 Undergraduate Seminar (2) FWSp

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.

Frank D. Gibbons III, *Chair*

Joel Carter
Dale R. Christiansen
Kent Kurtz
Raymond Orton
Frederick Roth

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 REC and PA	PA	100	(2)
Landscape Horticulture Principles and Practices	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)
Recreation Concepts	PA	219	(3)
Turf Management	PA	233	(4)
Aquatic Facility Management	PA	325	(4)
Diseases of Park Plants	PA	327	(4)
Arboriculture	PA	328	(3)
Landscape Contracting	PA	415	(3)
Landsc. Spec. & Est.	PA	416	(4)
Park Facilities Management	PA	425	(4)
Park Policies and Procedures	PA	426	(4)
Budgeting and Finance of Parks	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)

Introduction to Arthropods	AGB	165	(4)
Construction Fundamentals	AE	121	(2)
Utility Systems	AE	122	(2)
Surveying Fundamentals	AE	131	(2)
Landscape Sprinkler Irrigation	AE	321	(4)
Legal Env. of Bus. transactions	FRL	201	(4)
Basic Soil Science	SS	231	(4)
Soil Fertility and Fertilizers	SS	233	(4)
Plant Struc/Functions	BOT	124	(5)
Electives			(13-14)

GENERAL EDUCATION

(Required of all students)

Category I
- Communications in the English Language
  - Freshman English I — ENG 104 (4)
  - Freshman English II — ENG 105 (4)
    - *or* Report Writing — COM 216
  - Advocacy and Argument — COM 204 (4)

Category II
- Science and Mathematics
  - Area A
    - College Algebra — MAT 105 (4)
  - Area B
    - College Chemistry — CHM 104 (3)
    - College Chemistry Lab — CHM 141 (1)
  - Area C
    - Basic Biology — BIO 115 (5)
  - Area D
    - Any course on list (4)

Category III
- Art, Literature, Philosophy, and Foreign Language
  - Area A. Arts
    - The History of Garden Art — PA 214 (4)
  - Area B. Philsophy and History
    - Any course on list (4)
  - Area C. Literature and Foreign Language
    - Elementary Spanish I (4)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Category IV
Social Sciences
Area A. Economic
Any course on list ____ .....(4)
Area B. Social
Recreation Mgt. in Urban Settings . REC 330 (4)
Area C. Political and Historical
Any course on list .....(4)
Category V
The Integrated Being
General Psychology ..... PSY 201 (4)
Category VI
U.S. History, Constitution, and American Ideals
American Civilization ..... AMC 201 (4)
or Intro. to American Government ..... PLS 201
American Civilization ..... AMC 202 (4)'
or U.S. History ..... HST 202
Category VII
Upper Division
Management Accounting ..... ABM 324 (4)
Personnel Management ..... ABM 402 (4)

PARK ADMINISTRATION MINOR

(Required of all students)

Landscape Horticulture Principles and Practices	OH	131	(4)
Plant Materials I—Trees	OH	231	(4)
Park Facility Management	PA	425	(4)
or Aquatic Facility Management	PA	325	(4)
Arboriculture	P	A328	(3)'
Park Policies and Procedures	PA	426	(4)
Park Budgeting and Financing	PA	427	(4)
Athletic Turfgrass Management	PA	332	(3)

Course Descriptions

All courses may be taken on a CR/NC basis except by majors.

PA 100 Introduction to Recreation and Park Administration (2)

An introduction to the Recreation Administration 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. Required of all PA majors. Must be taken within three quarters from entrance. (C-2)

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. Graded on a CR/NC basis only.

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 Garden Art (4) FWSP

The relationship of ornamental flora to the human living experience to show the continuity with contemporary gardens, homes, parks and other arts. An introduction to the various styles in landscape art as they developed in different cultures and in succeeding ages. 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 220 Introduction to Forestry (3) F

An introduction to the fundamentals of forestry including forest ecology and resource management, a review of local, state and federal agencies which oversee forest resources in the United States, the practice of silviculture, and the issues involved in the multiple use of forest lands. 3 one-hour lectures.

PA 233 Turf Management (4) FSp

Considerations 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: SS 221 or 231.

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)

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 of Park Plants (4) F

The effect of diseases 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 three-hour laboratory.

PA 328 Arboriculture (3)

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, BOT 124.

PA 332 Athletic Turfgrass Management (3) FSp

The management of sports turf including establishment, renovation, and cultural practices. Includes baseball, football, soccer, lawn bowling, and other sports played on grass. 2 lectures, 1 three-hour laboratory. Prerequisite: Junior standing or consent of instructor. For non-majors.

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. Graded on a CR/NC basis only.

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 233.

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. 2 lectures, 1 three-hour laboratory. Prerequisites: PA 233, 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) FW

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 461 grade only.

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.

Gaylord P. Patten, *Chair, Plant and Soil Science Department*

Robert J. Tullock, *Coordinator*

James A. Pomerening Victor Wegrzyn

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 utility 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 laboratory and field facilities which have 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 Agricultural Research Service. 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)

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 and Plant Analysis	SS	339	(3)
Soil Taxonomy	SS	342	(3)
Soil Chemistry	SS	431	(4)
Soil Physics	SS	432	(4)
Soil Morphology and Survey	SS	433	(4)
Senior Project	SS	461	(2)
Senior Project	SS	462	(2)
Undergraduate Seminar	SS	463	(2)

Plus 16 units of specialization in either Business, Computers, Pests and Environmental Quality, or Production (See Advisor)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

General Surveying	AE	232	(3)
or			
Surveying Fundamentals	AE	131	(2)
Irrigation	AE	240	(4)
Introduction to Arthropods	AGB	165	(4)
Animal Agricultural Science	AS	111	(4)
Plant Structures & Functions	BOT	124	(5)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

College Chemistry ..... CHM 105 (3)
College Chemistry ..... CHM 106 (3)
College Chemistry Laboratory ..... CHM 142 (1)
College Chemistry Laboratory ..... CHM 143 (1)
Elements of Organic Chemistry ..... CHM 201 (3)
Quantitative Chemistry ..... CHM 221 (4)
Elements of Organic Chemistry Laboratory ..... CHM 250 (1)
Principles of Geology ..... GSC 111 (3)
Principles of Geology Laboratory ..... GSC 141 (1)
Trigonometry ..... MAT 106 (4)
Basic Microbiology ..... MIC 201 (5)
College Physics ..... PHY 121 (3)
College Physics ..... PHY 122 (3)
College Physics Laboratory ..... PHY 141 (1)
College Physics Laboratory ..... PHY 142 (1)
Introduction to Statistics ..... STA 107 (4)
or
Elementary Statistics with Applications ..... STA 120 (4)

GENERAL EDUCATION REQUIREMENTS

Category I: (Pattern 2)
A. Freshman Composition ..... ENG 104 (4)
B. Advocacy and Argument ..... COM 204 (4)
C. Freshman Composition ..... ENG 105 (4)
or
Report Writing ..... COM 216
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. Any course on list ..... (4)
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 course. Minimum total ..... (4)
Category VI:
Select one course from each area. Minimum total ..... (8)
Category VII:
Select one of the approved packages. Min 12 units ..... (12)

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 (4)
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.

†All courses offered in Soil Science may be taken on a CR/NC basis except by majors or by students taking minor in Soil Science.

SS 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. *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) W

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. *Wegrzyn*

SS 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. *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) F

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) Sp

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)

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)

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 (4) 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, 1 three-hour laboratory. 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) WSp

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 lectures, 1 three-hour laboratory. Prerequisite: SS 231. *Tullock*

SS 441, 442 Internship in Soil Science (1–4) (1–4)

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. Courses may be repeated for maximum of 12 units total. 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. Must be taken in sequence. *Staff*

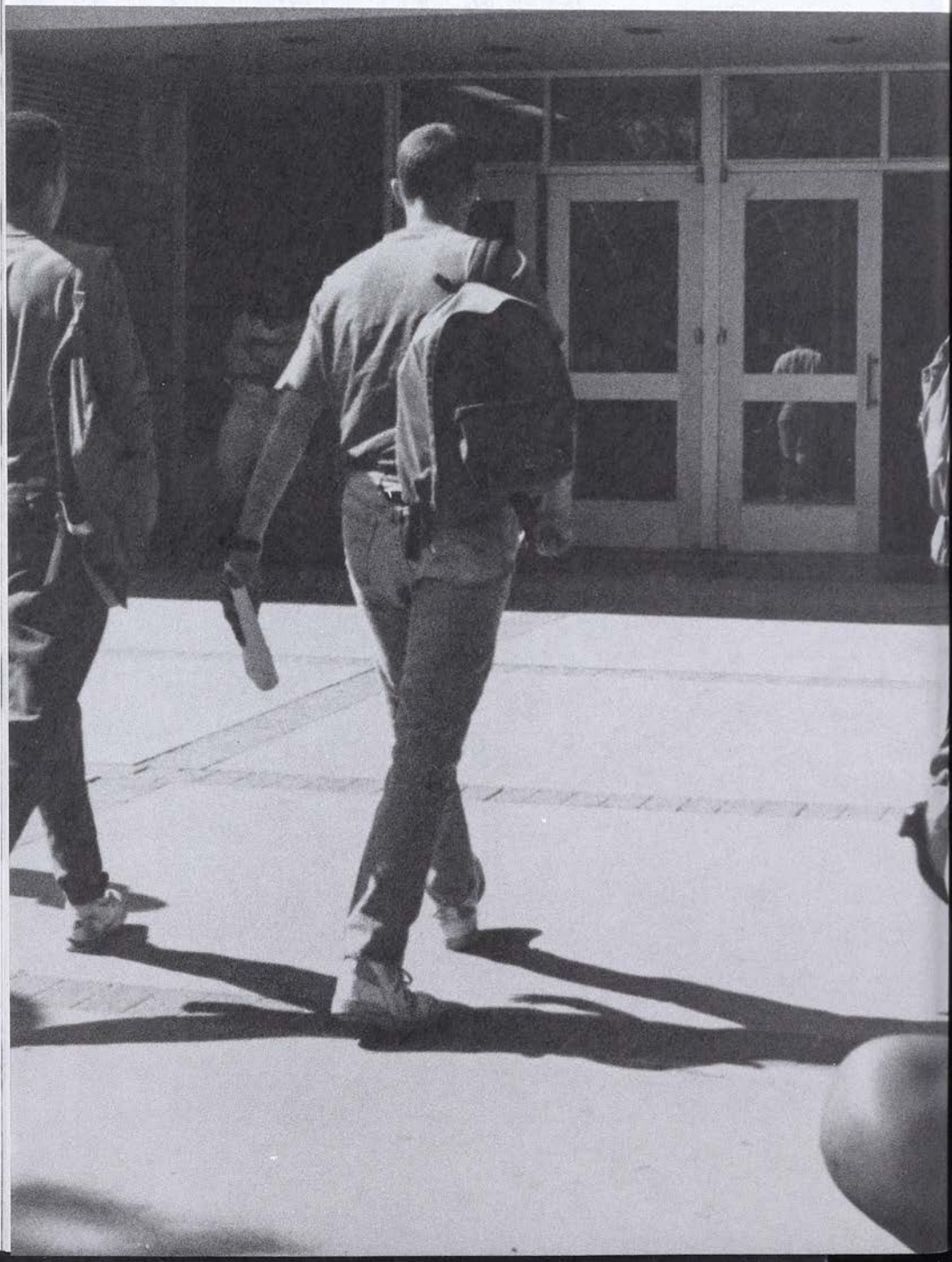
SS 463 Undergraduate Seminar (2) FSp

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. Prerequisites: SS 462 and successful completion of the GWT.

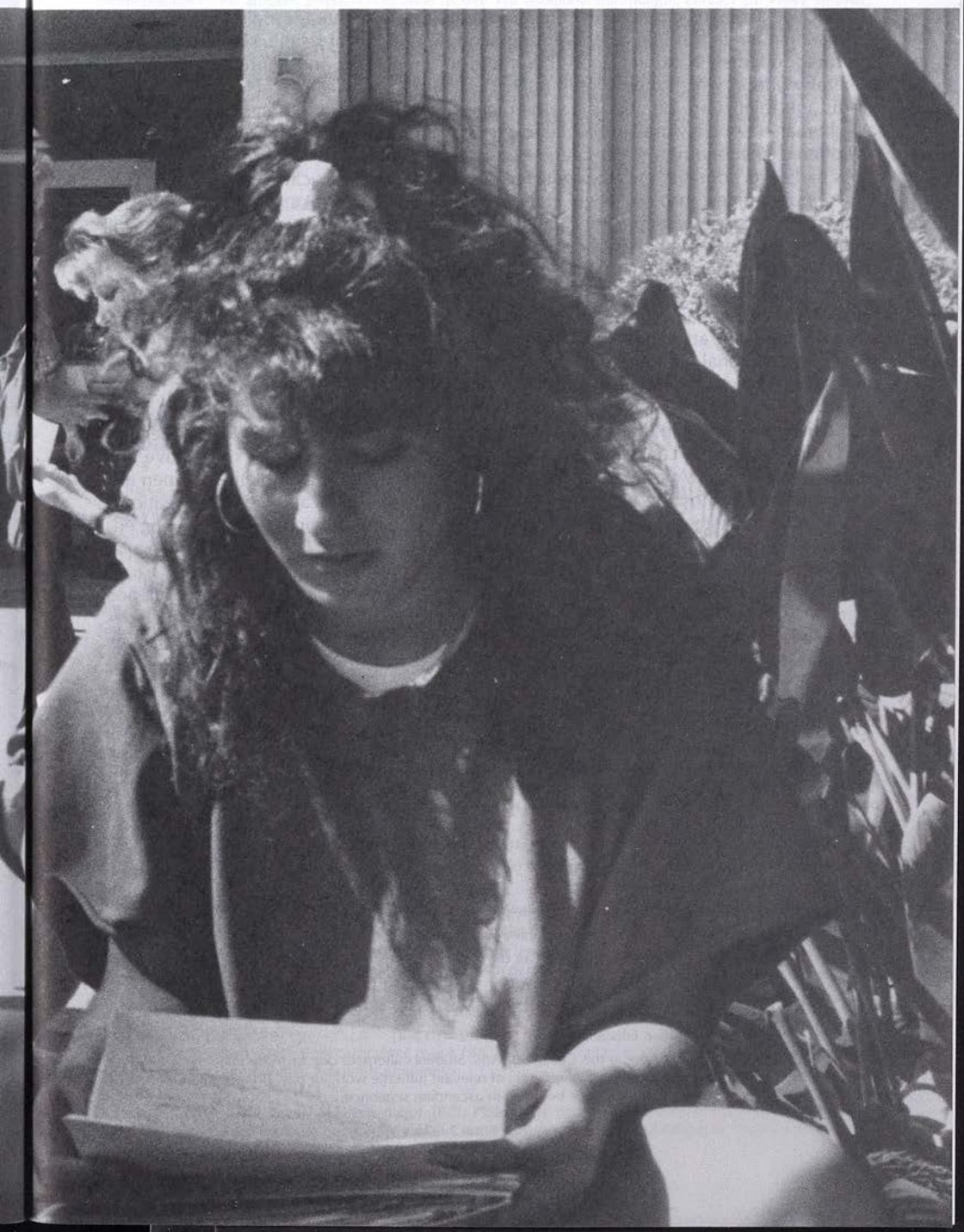
SS 499 Special Topics for Upper Division Students (1–4)

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. *Staff*

COLLEGE OF ARTS



COLLEGE OF ARTS



COLLEGE OF ARTS

James H. Williams, *Dean*, College of Arts
Jane Serumgard Harrison, *Associate Dean for Academic Affairs*
Joseph A. Tiffany, *Associate Dean for Business Affairs*

The College of Arts provides an education in ways that encourage individuals to search for meaning in life through reason, imagination, and personal relationships; to come to informed judgments and act upon them; and to understand and appreciate the multicultural world in which they live. In pursuit of these objectives, Bachelor's degree programs and minors are offered in a wide range of disciplines in the fine and performing arts, humanities, behavioral and social sciences, and physical education. Master's degrees are offered in economics, English, and physical education.

As part of its commitment to excellence in undergraduate education, the College provides opportunities, through its general education offerings, for students to prepare for their roles as active, participating citizens of the several communities to which they will ultimately belong. An innovative approach to this aspect of the College's mission is the award-winning Interdisciplinary General Education Program.

The College of Arts offers to the University and the communitjy a wide range of cultural experiences that are a part of its academic programs. Drama and dance productions, music programs, and art exhibits are produced and sponsored by the respective departments. International quarters under the direction of the Office of the Dean expose students to diverse social, political, and cultural worldviews.

Communications media, including publications, radio, television, and debate programs are advised by faculty in the Communication Department, while faculty and students in the English & Foreign Languages Department produce annual journals of creative and scholarly writing drawn from all areas of the University. Intramural athletics for men and women are offered by the Department of Health, Physical Education, and Recreation.

With other colleges in the University, the College of Arts participates in continuing education in support of the concept of life-long learning. The public may enroll in regular university classes through the Office of Continuing Education.

The College of Arts offers fourteen Bachelor of Arts degrees, six Bachelor of Science degrees, twenty-nine minors, three 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.

COOPERATIVE EDUCATION

Joseph A. Tiffany, *Coordinator for College of Arts*

The College 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 College 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 College 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 ADAPTED PHYSICAL EDUCATION

The Health, Physical Education, and Recreation Department awards a certificate of merit in adapted physical education to students satisfactorily completing a sequence of courses in the area of physical activity for the handicapped. The requirements for the certificate are basically the same as those for credentialed physical educators working toward the emphasis credential in adapted physical education. The certificate is awarded upon the recommendation of the adapted physical education faculty. For additional information, contact Dr. Perky Stromer, ext. 2776.

CERTIFICATE IN CRIMINAL JUSTICE & CORRECTIONS

A multi-departmental Certificate Program in Criminal Justice and Corrections is offered under the sponsorship of the Dean of the College of Arts. This program (also a minor) is comprised of 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 Criminal Justice Coordinator, Dr. Wayne S. Wooden, Behavioral Sciences Department. (See also Behavioral Sciences section of this catalog for a listing of the courses.)

CERTIFICATE IN GERONTOLOGY

A multi-departmental Certificate Program in Gerontology is offered under the sponsorship of the Dean of the College 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 Sciences

INTERDISCIPLINARY GENERAL EDUCATION PROGRAM

32-unit general education program. (See University Programs section of this catalog for a description of the program and a listing of the courses.)

Departments and Majors/Minors

ART

Charles Fredrick, *Chair,* Art major (BA); Options in Design and Fine Arts; Art History minor

BEHAVIORAL SCIENCES

Nancy J. Harkey, *Chair,* Behavioral Sciences major (BA); Sociology major (BA); Psychology major (BA); Criminal Justice and Corrections minor, Psychology minor, Sociology minor.

COMMUNICATION

T. Harrell Allen, *Chair,* Communication major (BS); Options in Journalism, Organizational Communications, Public Relations, Specialized Communications, and Telecommunications; Communications minor, Newspaper Journalism minor, Public Relations minor, Speech Communication minor

ECONOMICS

Sidney Blumner, *Chair,* Economics major (BS); Master of Science in Economics, Economics minor

ENGLISH AND FOREIGN LANGUAGES

Victor N. Okada, *Chair,* English major (BA), Humanities major (BA), Master of Arts in English, English minor, Spanish minor

ETHNIC AND WOMEN'S STUDIES

Richard Santillan, *Chair,* Afro-American Studies minor, American Indian Studies minor, Asian-Pacific Studies minor, Chicano-Hispanic Studies minor, Women's Studies minor

HEALTH, PHYSICAL EDUCATION and RECREATION, (HPER)

Bruce Coulter, *Chair,* Physical Education major (BS); Recreation Administration major (BS); Options in Management, Outdoor, and Therapeutic Recreation; Master of Science in Physical Education; Recreation Administration minor

HISTORY

Stephen Englehart, *Chair,* History major (BA), History minor, Latin American Studies minor

LIBERAL STUDIES

Sheila McCoy, *Chair,* Liberal Studies major (BA); Options leading to Liberal Studies Credential, Bilingual Cross-cultural (Chicano) Credential, and Liberal Studies (non-credential).

MUSIC

William Carter, *Chair,* Music major (BA), Music minor

POLITICAL SCIENCE

Ronald M. Peterson, *Chair,* Political Science major (BA); Options in Political Science and Public Administration; Political Science minor, Public Administration minor

SOCIAL SCIENCES

David G. Lord, *Chair,* Social Sciences major (BS); Philosophy major (BA); Anthropology/Geography major (BS); Options in Anthropology/Geography and in Cartography/Remote Sensing; American Studies major (BA);

American Studies minor, Anthropology minor, Geography minor, Philosophy minor, Religious Studies minor.

SOCIAL WORK

Charles Frost, *Chair*, Social Work major (BA)

THEATRE AND DANCE

James Martin, *Chair*, Drama major (BA), Drama minor, Dance minor

College of Arts Related Coursework

SA 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.

SA 290 Communications and Aesthetics (4)

An interdisciplinary introduction to the visual and communicative arts. Students will analyze, discuss, and evaluate issues and concepts which bridge the arts. Critical evaluation of qualitative issues will be stressed. Course specially designed to meet General Education requirements for students in The College of Engineering. Meets Category I and III requirements in critical thinking and aesthetics (humanities). Other students may take course but G.E. credit will be granted only to College of Engineering majors.

SA 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.

SA 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. Prerequisites: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

Interdisciplinary General Education (IGE)

Director

James Manley, *Associate Director*

Nancy Ware, *Associate Director*

The IGE (INTERDISCIPLINARY GENERAL EDUCATION) Program is a team-taught, thematically integrated sequence of courses that meets many general education requirements in a stimulating intellectual environment. These requirements, which apply to all California State University campuses, help to broaden skills and understanding in areas beyond the major (such as social science, literature, composition). Usually these requirements are fulfilled by taking separate courses.

FIRST YEAR (F,W,Sp)

IGE 120 Consciousness and Community: Origins and Development of Human Societies (4)

Chronology and civilization; origin of consciousness and myths of origin; symbol and ceremony; people and the environment. Prerequisite: EPT score of 147 or better. (F)

IGE 121 Rationalism and Revelation: The Ancient World (4)

Myth and history; tragedy, humanism, justice, and freedom; subject and citizen. Prerequisite: IGE 120. (W)

IGE 122 Authority and Faith: Feudalism and the Renaissance (4)

Forms of social and economic organization; cultural and intellectual renewal; varieties of spatial organization; secular and sacred forms of aesthetic expression. Prerequisite: IGE 121. (Sp)

SECOND YEAR (F,W,Sp)

IGE 220 Culture and Contact: The Expansion of the West (4)

Exploration and ethnocentrism; the nation state and national artistic cultures; the scientific revolution. Prerequisite: IGE 122. (F)

IGE 221 Reform and Revolution: The Age of Enlightenment (4)

Concepts of progress and individual rights in a time of political revolution; changes in social organization; restructuring of philosophical, scientific, and aesthetic thought. Prerequisite: IGE 220. (W)

IGE 222 Individualism and Collectivism, Competing Ideologies: The Industrial Age (4)

The machine and society; romanticism and realism; capitalism and socialism; population movements. Prerequisite: IGE 221. (Sp)

THIRD YEAR (F,W)

IGE 223 Promise and Crisis: The Modern World (4)

Nationalism and internationalism; world wars and nuclear threat; concept of the global village; ecological dilemmas; modernism and post modernism in the arts. Prerequisite: IGE 222. (F)

IGE 224 Connections Seminar: Exploration and Personal Expression (4)

Research and presentation of an interdisciplinary project; synthesis and integration of selected IGE Program themes. Prerequisite: IGE 223 (W)

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.

David G. Lord, *Chair,* Social Sciences Department

Richard S. Hyslop, *Coordinator*

Judith Anderson — Richard L. Johnson — John A. Moore
Walter P. Coombs — Sheila G. McCoy

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, and 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)
Indians of North America	ANT	321	(4)
or Hist of American Indians	HST	337	
Survey of American Literature	ENG	211	(4)
Survey of American Literature	ENG	212	(4)
U.S. and Canada Geography	GEO	350	(4)
Introduction to Cultural Anthropology	ANT	102	(4)
Cultural Areas of the World—U.S.	ANT	399	(4)
Introduction to Ethnic Studies	EWS	140	(4)
Sociology of Minority Communities	SOC	323	(4)
Contemporary American Scene	SSC	401	(4)
Additional courses selected in consultation with advisor			(16)

SUPPORT COURSES

(Required of all students)

Introduction to American Studies	AMS	203	(4)
Women in American Society	AMS	350	(4)
Varieties of American Culture	AMS	333	(4)
American Dreams, Myths and Realities	AMS	450	(4)
American Renaissance	ENG	452	(4)
or American Realism	ENG	454	
or 20th Century American Lit	ENG	456	
Diplomatic History of the U.S.	HST	340	(4)
Unrestricted electives			(24)

GENERAL EDUCATION REQUIREMENTS

Category I: (Pattern 1)			
Freshman English I	ENG	104	(4)
Public Speaking	COM	100	(4)
Logic and Semantics	PHL	202	(4)
Category II:			
A. Select one course			(4)
B. Select one course			(4)
C. Select one course			(4)
D. Select one course			(4)
Category III:			
A. Select one course			(4)
B. Select one course			(4)
C. Select one course			(4)
Category IV:			
A. Select one course			(4)
B. Select one course			(4)
C. United States History	HST	201	(4)
Category V:			
Select one course			(4)
Category VI:			
Group 1:			
American Civilization	AMC	201	(4)
Group 2:			
American Civilization	AMC	202	(4)
Category VII:			(8)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

(12 upper division units are required from a Theme or Depth package, 4 of which may replace lower division units in Categories II, III or IV. See Advisor.)

Total units required for degree .....(186)

(Total curriculum must include 60 units of upper division courses)

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	310	(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 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)
Public 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 203 Introduction to American Studies (4)

Examination of the uniqueness of the American Studies approach. Basic ideals and intellectual frameworks characterizing the discipline. Survey of key articles, books and bibliographical references. Career opportunities available to American Studies graduates. 4 lecture/problem-solving.

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)

Extensive student problem-solving of issues in American Studies methods and development. Includes interpretations, patterns, and applications of culture concept, myth-symbol, quantification, new journalism, media and popular culture. 4 lecture/problem solving. Prerequisites: Junior standing or permission of instructor.

AMS 333 Varieties of American Culture (4)

Selected forms of cultural life in America. Distinction and coherence in cultural forms such as music, art, architecture, and fashion. Includes personal experience. Prerequisites: AMC 201 or PLS 201, and AMC 202 or HST 202. 4 hours seminar.

AMS 345 American Ideologies (4)

Students will investigate frameworks of ideas that have had major impact on the American experience. Prerequisites: AMC 201 or PLS 201, and AMC 202 or HST 202. 4 lecture-problems.

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.

David G. Lord, *Chair,* Social Sciences Department

Harold F. Turnbull, *Anthropology Coordinator*

Crane S. Miller, *Geography Coordinator*

Joseph P. Beaton Joseph A. Tiffany Dorothy D. Wills

Thomas C. Blackburn

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)
Computer Geographics	GEO	104	(4)

ANTHROPOLOGY/GEOGRAPHY OPTION

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. With the exception of the regional geography courses, none of the courses specified for the Cartography-Remote Sensing Option may be selected for the Anthropology/Geography Option.

CARTOGRAPHY/REMOTE SENSING OPTION

Courses required to complete the core:

Field Geography	GEO	309	(4)
Earth from Space	GEO	310	(4)
Cartography	GEO	311	(4)
Advanced Field Techniques	GEO	409	(4)
Photographic Remote Sensing	GEO	410	(4)
Advanced Cartography	GEO	411	(4)
Digital Image Processing	GEO	420	(4)
Computer Cartography	GEO	421	(4)
Geographic Information Systems	GEO	440	(4)
Internship in Cartography/ Remote Sensing	GEO	441	(4)
or			
One upper division regional geography course chosen in consultation with advisor			(4)

SUPPORT COURSES

(Required of all students)

Social Sciences Methodology	SSC	333	(4)
or			
Equivalent chosen in consultation with student's advisor			
Undergraduate Seminar	SSC	463	(2)
Unrestricted electives			(48)

GENERAL EDUCATION REQUIREMENTS

CATEGORY I: (Pattern 1)

Freshman English I	ENG	104	(4)
Public Speaking	COM	100	(4)
Logic and Semantics	PHL	202	(4)

CATEGORY II: (Pattern 1)

A. Elementary Stat w Appl	STA	120	(4)
B. Principles of Geology	GSC	111	(3-5)
C. Basic Biology	BIO	115	(4)
D. Select one course			(4)

CATEGORY III:

A. Select one course			(4)
B. World Religions: Oriental	PHL	210	(4)
or			
World Religions: Medit Wld	PHL	211	
C. Select one course			(4)

CATEGORY IV:

A. Select one course			(4)
B. Principles of Sociology	SOC	201	(4)
C. Select one course			(4)

CATEGORY V:

Human Nature/Affairs	ANT	201	(4)

CATEGORY VI:

Group 1:

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

American Civilization . . . AMC 201 (4)
Group 2:
American Civilization . . . AMC 202 (4)
CATEGORY VII:
12 Upper Division units are required from a Theme or Depth package, 4 of which may replace lower division units in Category II (Anthro. only) and Categories III or IV (Anthro/Geo.) . . . (8)
Total units required for degree . . . (198)

ANTHROPOLOGY MINOR

Introduction to Physical Anthropology and Prehistory . . . ANT 101 (4)
Introduction to Cultural Anthropology . . . ANT 102 (4)
Indians of California . . . ANT 320 (4)
or Indians of North America . . . ANT 321
Environment, Technology and Culture . . . ANT 350 (4)
or Developmental Anthropology . . . ANT 352
or Medical Anthropology . . . ANT 357
Psychological Anthropology . . . ANT 355 (4)
or Anthropology of Religion . . . ANT 360
Social Anthropology . . . ANT 358 (4)
or Women: An Anthropological View. ANT 405
Field Archaeology . . . ANT 394 (4)
or Man The Primate: Comparative Primatology . . . ANT 440
Cultural Areas of the World . . . ANT 399 (4)
Total units required for 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)
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 for minor . . . (32)

Note: Both the Geography and the Anthropology Minors may be taken by Social Science Majors.

Anthropology

ANT 101 Introduction to Physical Anthropology (4)

Human biology and behavior. The evolution of the human species as an adaptive biological process. Human ecology in evolutionary perspective. Human growth, development and diversity. The evolution and behavior of nonhuman primates. 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 103 Introduction to Archaeology and Prehistory (4)

Basic methods of archaeological reconstruction and interpretation. Survey of human cultural developments from their first appearance to the beginnings of urban lifeways and the formation of early civilization. 4 lecture-discussions.

ANT 201 Human Nature/Human Affairs: A Biocultural View (4)

Integrated exploration of both cultural and biological factors affecting critical cultural/ethical issues such as intelligence, aggression and territoriality, sexism, racism, and altruism. Relationship of these issues to individual and cultural systems from a comparative perspective. 4 lecture-discussions. Meets "Integrated Being" G.E. requirement.

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)

Analysis of social, linguistic, ideological and technological diversity among indigenous peoples of California. Emphasis on a broad appreciation of native California lifestyles through a detailed study of representative societies. Prerequisites: ANT 102 or permission of instructor. 4 lecture-presentations.

ANT 321 Indians of North America (4)

Seminar on aboriginal peoples of North America; analysis of various adaptation and cultural subsystems in original culture areas; the status and role of Native Americans present and future. Extensive student presentations and research. 4 seminar-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 350 Environment, Technology and Culture (4)

Student focused investigation of the interrelationships between a society's subsistence and economic systems, level of socio-cultural development, and the natural and social environment inhabited. Tools and techniques utilized by particular societies in their exploitation of their surroundings. 4 hours seminar-discussion. 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 Development Anthropology (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 culture and cultural sub-systems as viewed from a developmental perspective. 4 lecture-discussions. Prerequisite: ANT 102 or permission of instructor.

ANT 354 Laws, Values, and Culture (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 Psychological Anthropology (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 Cultures in Performance: Human Expression in Cross-Cultural Perspective (4)

Traditional forms of expressive behavior and cultural performance (including mythology and folklore, ritual, festivals, drama, games, and sports) that reflect, reinforce, and reinterpret cultural identity; symbolic communication, aesthetic and cognitive expression, social functions, and cultural reflexivity in different performance genres. 4 lecture-presentations. Prerequisites: Junior or Senior Standing. ANT 102 or permission of instructor.

ANT 357 Medical Anthropology (4)

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-presentations. 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)

Cross-cultural comparison of religion at all levels of social organization. Student analysis of theories of origin and process including revitalization movements. Witchcraft, sorcery, and shamanism as social institutions. Involves student presentations and critiques. 4 lecture/problem solving. Prerequisites: ANT 102 or permission of instructor.

ANT 380 History of Anthropological Theory (4)

Chronological investigation by students of the major schools of thought within anthropology. Evolution of analytical theory and research methodology in each of the discipline's quadrants. Primary figures in anthropology, their lives and work, their impact on developments in the discipline. 4 hours seminar-discussion. Prerequisites: Junior or Senior Standing, ANT 102 or permission of instructor.

ANT 390 Methods in Anthropology (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.

ANT 391. Primitive Technologies (4)

Toolmaking and use in pre-industrial societies. Overview of practical and theoretical trends in the development of technology from earliest times to the advent of urban living. "Hands-on" experience in making early tools in various societies. 2 hours lecture/4 hours activity. No prerequisite.

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. 2 lecture-discussions, 4 hours activity. Prerequisite: ANT 102 or permission of instructor.

ANT 395 Laboratory Analysis in Anthropology (4)

Methods of collection, processing, description, and analysis of various kinds of anthropological data. Methodological and theoretical foundations; quantitative and qualitative approaches to laboratory studies in anthropology. Emphasis dependent upon available faculty specializations. 2 hours lecture-discussion, 4 hours activity. Prerequisite: ANT 101 or ANT 102 or ANT 103 and permission of instructor. May be repeated twice for credit whenever a new topic is offered.

ANT 397 Cultural Resource Management (4)

Philosophical and practical aspects of cultural resource management. History and current status of laws and procedures affecting the protection, evaluation, and management of prehistoric, historic, ethnographic, and other cultural resources, with particular emphasis on California. 4 lecture presentations. Prerequisite: Junior or Senior standing. ANT 102 or ANT 103 or permission of instructor.

ANT 399 Cultural Areas of the World (4)

Enthnographic and ethnohistorical survey of selected cultural areas depending on available faculty specialization. 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)

Seminar in intensive cross-cultural examination of woman. Includes physical anthropology of woman; role and status; culture and personality; affective and contractual bonding; future trends in relationships. Student research and presentations. 4 seminar/discussion. Prerequisites: ANT 102 or permission of instructor.

ANT 440 Humans as Primates: 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 445 Human Evolution and Variation (4)

Student investigation of the origins, evolution, and differentiation of the human species. Critical examination of the varying theories concerning the fossil record of human evolution and the origins and development of racial variation. Analysis of modern biological data relevant to these theories. 4 hours seminar-discussion. Prerequisites: Junior or Senior standing. ANT 101 or ANT 103 or permission of instructor.

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 human 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 human 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. Student analyses and presentation of their findings. 4 lecture-discussions.

GEO 104 Computer Geographics (4)

Introduction to the utilization of computer hardware and software in geography with emphasis on microcomputer applications in cartography, desktop mapping, geographic information systems, remote sensing and videography. 4 lecture/problem solving.

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)

Extensive student participation in basic methods of geographic field analysis in basic methods of geographic field analysis of small areas, including rural and urban types, and physical and cultural aspects. Theory and practice in field sampling. 4 lecture/problem solving.

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 104 or GSC 111 or GSC 175 or equivalent.

GEO 311 Cartography (4)

Discussion and individual instruction in the preparation of maps and charts.-Includes as survey of source materials such as maps, aerial photography, and census and other statistical data. Student interpretation of maps and aerial photographs as a source of geographic patterns. 3 lecture/problem solving, 1 three-hour laboratory. Prerequisite: GEO 101 or 103 or 104 or GSC 111 OR 175 or consent of instructor.

GEO 312 Economic Geography (4)

Economic aspects of man's environment, implications of the distribution and location of natural resources, significance of physical and cultural landscapes. In-depth study of major problems. 4 lecture/problem solving.

GEO 313 Political Geography (4)

The student oral and written presentations analyzing factors such as: location, size, shape, surface, climate, natural resources, economic aspects in the rise and fall of states. Comparative analysis of nations in relation to natural and cultural conditions, with emphasis on current problems in domestic and international affairs. 4 lecture/problem solving.

GEO 315 Urban Geography (4)

Student analysis and presentation of the problems in the origin and evolution of cities. Includes size, functions, distribution patterns, supporting and tributary areas, and roles within the whole political, social and economic structure of a region; includes suburbs and problems of metropolitan areas. 4 lecture/problem solving.

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)

Student analysis and presentations of topics and problems in the physical, cultural and regional patterns of the United States and Canada with emphasis on the economic geography. 4 lecture/problem solving.

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)

Student analysis and presentations on the impact of natural environment and regional patterns in the USSR on major current trends in social, cultural, economic and political development, as well as on the changing international role of the Soviet Union. 4 lecture/problem solving.

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. 4 lecture-discussions.

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)

Student analysis and presentations of issues in the natural environment and the cultural landscape of Europe. Major current trends in social, cultural, economic and political developments in Western and Eastern Europe; relationship between historical and geographical diversity. 4 lecture/problem solving.

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)

Guidance and critiquing of student work in the analysis an evaluation of the geographical characteristics of the natural environment and its human use. Includes field mapping, systematic and random sampling of spatial phenomena, and environmental impact reporting. 4 lecture/problem solving. Prerequisites: GEO 309 or permission of instructor.

GEO 410 Photographic Remote Sensing (4)

Student 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 maps and mosaics from air photos and satellite photos. 4 lecture/problem solving. Prerequisites: GEO 310 or permission of instructor.

GEO 411 Advanced Cartography (4)

Advanced applications by students in theory and practice of modern cartographic principles. Emphasis on terrain representation, color separation, computer cartography, scribing and reproduction. 3 lecture/problem solving, 1 three-hour laboratory. Prerequisites: GEO 311 or equivalent.

GEO 420 Digital Image Processing (4)

Students solve problems in the use of computers in remote sensing. Analysis and interpretation through aerial photographs and scanner images digitally processed to examine the ground scene. Key concepts: spectral reflectance/emittance of terrain features; multispectral scanners; image restoration, enhancement, classification, and storage; spectral pattern recognition. 4 lecture/problem solving. Prerequisites: CS 101 or CIS 110 and GEO 410 or permission of instructor.

GEO 421 Computer Cartography (4)

Extensive student presentations on the utilization of computers to draw maps. Use of digitizers and other computer mapping input devices; SYMAP and other computer mapping programs using line printers and plotters as output devices. Application of geographic information systems. 3 lecture/problem solving; 1 three-hour laboratory. Prerequisites: CS 101 or CIS 110 and GEO 411 or permission of instructor.

GEO 440 Geographic Information Systems (4)

Concepts in the framework of geographic information systems. Basic techniques for the computer processing of geographical systems analysis and modelling. 4 lecture/problem solving. Prerequisites: GEO 101 or 103 or 104, or GSC 111 or 175, CIS 110, or consent of instructor.

GEO 441 Internship in Cartography-Remote Sensing (4)

On-the-job training in cartography and/or image interpretation for at least 10 hours per week or a minimum of 100 hours per academic quarter. Prerequisites: Senior standing and the consent of the internship coordinator.

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.


CULT
EXPRESSIONS
FEB. 16-MAR.

ART

Charles D. Fredrick, *Chair*
Diane Divelbess
Eileen M. Fears
Joe Hannibal
Maren H. Henderson
Yoram Makow
Sandra Rowe
Stanley C. Wilson

The art major program provides a sequence of courses leading to the bachelor of arts degree; the program consists of two options, one in Fine Arts and one in Design. Both options are 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 in Fine Arts should expect to develop skills and knowledge in painting, drawing, printmaking, ceramics, sculpture and art history. Students in Design should expect to develop skills in graphic design, printing, illustration, exhibition design and computer generated art, among others. Such skills, from either option, will enable students to find employment in art, design and related fields, or to pursue their education at the graduate level.

Because art is one of the approved subjects for the California Single Subjects Teaching Crendential, a student majoring in art at Cal Poly under the Fine Arts option may wish to prepare for a career in teaching. The art major program at Cal Poly has been approved by the California Commission on Teacher Credentialing as a Single Subject Waiver Program. This means that a student who majors in art at Cal Poly is waived from taking and passing the National Teachers Examination in Art before applying for a teacher crendentialing program. The course requirements for the Waiver Program in Art are the same as that listed below for the Fine Arts Option in Art.

A number of art courses are available for the general university student as well.

CORE COURSES FOR MAJOR*

(Required of all students)

Introduction to Drawing	ART	140	(3)
Introduction to Design	ART	150	(3)
History of Western Art	ART	212	(4)
History of Western Art	ART	213	(4)
History of Western Art	ART	214	(4)
Senior Project	ART	461	(2)
Senior Project	ART	462	(2)
Undergraduate Seminar	ART	463	(2)

OPTION COURSES FOR MAJOR*

(Required in specific options)

ART/FINE ARTS

Intro to Clay	ART	130	(3)
Foundations of Drawing	ART	141	(3)
Intro to Crafts	ART	190	(3)
History of Tribal Art	ART	211	(4)
OR			
History of Asian Art	ART	216	
Intro to Painting	ART	220	(3)
Intermediate Drawing	ART	242	(3)
Life Drawing	ART	244	(3)
Printmaking	ART	260	(3)
Fundamentals of Sculpture	ART	280	(3)
Art of the 20th Century	ART	313	(4)
Minimum of 20 upper division units in Art with consent of advisor			(20)

DESIGN

Lettering & Typography	ART	251	(3)
Graphic Layout	ART	252	(3)
2-D Design	ART	253	(3)
Graphics: Intro to the Computer as a Medium	ART	255	(3)
Screen Printing	ART	262	(3)
Exhibition Design	ART	288	(3)
Drafting for Artists	ART	342	(3)
Drawing for Illustration	ART	346	(3)
Advanced Graphics	ART	352	(3)
Graphic Media and Production	ART	354	(3)
Graphic Design by Computer	ART	355	(3)
Video and Computer Generated Art	ART	356	(3)
Advanced Screen Printing	ART	362	(3)
OR			
Gallery and Exhibition Design	ART	388	
Advanced Design	ART	453	(3)
Motion Graphics: Computer Assisted Design	ART	456	(3)

SUPPORT AND ELECTIVE COURSES

(Required in specified options)

ART/FINE ARTS

Intermediate Painting	ART	324	(3)
or Transparent Watercolor	ART	325	
Life Drawing	ART	344	(3)
or Expressive Drawing	ART	345	
or Drawing for Illustration	ART	346	
Approved electives, chosen in consultation with advisor			(18)

DESIGN

Foundations of Drawing	ART	141	(3)
Art of the 20th Century	ART	313	(4)
Photography	COM	131	(4)
Principles of Marketing	MKT	301	(4)
Advertising Principles	MKT	307	(4)
Approved electives chosen in consultation with advisor			(12)

GENERAL EDUCATION

Category I Any pattern			(12)
Category II Any pattern			(16)
Category III			
Introduction to Theatre	DR	203	(4)
or Intro to Music	MU	100	
or Music Appreciation	MU	101	
or Meaning of Architecture	ENV	112	
History of World Civ	HST	101	(4)
or Hst of World Civ	HST	102	
One additional course (Area C)			(4)
Category IV Select from G.E. lists			(12)
Category V Any course from G.E. list			(4)

Category VI Any pattern.....(8)
Category VII See advisor.....(8)
(Additional 4 units upper division coursework replaces units in Cat. II, III or IV)

† 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) from the following:

History of Tribal Arts	ART	211	(4)
History of Art in the USA	ART	310	(4)
Foundations of Modern Art	ART	312	(4)
Art of the Twentieth Century	ART	313	(4)
Art of Mexico, Central & South America	ART	314	(4)
Art of 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)

* A 2.0 cumulative GPA is required in core courses including courses for the major in order to receive a degree in this major.

Course Descriptions

ART 110 The Visual Arts (4)

Introduction to basic forms, styles, and aesthetics of the visual arts. Includes Western and Non-Western cultures. 4 lecture/discussion.

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 activity.

ART 140 Introduction to Drawing (3)

Analysis and practice of drawing. Problems involving development of perception. Emphasis on concepts and methods. 6 hours activity.

ART 141 Foundations of Drawing (3)

Study of drawing with emphasis on depictive concepts, materials, tools and techniques. 6 hours activity. Prerequisite: Art 140 or permission of instructor.

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 activity.

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 activity.

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 216 History of Asian Art (4)

Survey of art and architecture of India, Southeast Asia, China, Korea and Japan. 4 lecture/discussion.

ART 220 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 activity. Suggested: Art 140, 141 and 150.

ART 225 Fundamentals of Watercolor Painting (3)

Methods and techniques with transparent watercolor. Outdoor sketching and studio projects. 6 hours activity. Prerequisite: Art 140 and Art 150 or permission of instructor.

ART 242 Intermediate Drawing (3)

A synthesis of the basic drawing elements—line, value, texture, composition and perspective—with an imaginative and self-expressive use of material. 6 hours activity. Prerequisite: Art 140 and Art 141 or permission of instructor.

ART 244 Beginning Life Drawing (3)

Skills and techniques in drawing the human figure from studio models. 6 hours activity. Prerequisite: ART 140 or permission of instructor.

ART 251 Lettering and Typography (3)

Development of appreciative and skillful usage of alphabets. Techniques of forming and spacing letters. 6 hours activity.

ART 252 Graphic Layout (3)

Design principles of visual communication. Projects in page layout, corporate image, and advertising design. 6 hours activity. Prerequisite: Art 251 or permission of instructor.

ART 253 Two-Dimensional Design (3)

Elements and principles of two-dimensional design, especially color theory and visual perception. 6 hours activity. Prerequisite: Art 150 or permission of instructor.

ART 255 Graphics: Introduction to the Computer as a Medium (3)

Introduction to use of personal computers in design, visual communication and fine arts. Emphasis on aesthetics in computer generated images created through use of existing menu-driven software and variety of input devices. 6 hours activity. Prerequisite: Art 150 or permission of instructor.

ART 260 Printmaking (3)

Method and techniques of printmaking. Relief, intaglio and silk screen processes. 6 hours activity.

ART 262 Screen Printing (3)

Screen printing as an art form using paper, glue, lacquer film stencils and photo techniques. 6 hours activity.

ART 280 Fundamentals of Sculpture (3)

Fundamentals of sculpture involving modeling, carving or forming clay, plaster, wood, stone and metal. 6 hours activity. Suggested: Art 130 and Art 190.

ART 288 Exhibition Design (3)

Practices and projects in exhibition design and display. Includes wall display and gallery installation. 6 hours activity.

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 310 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 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 or permission of instructor.

ART 314 Art of Mexico, Central and South America (4)

Arts of pre-Columbian civilizations and the colonial period to the present. 4 lecture/discussion.

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 319 History of Design (4)

Survey of great periods of design from ancient to modern. Western and non-western civilizations. Emphasis on modern period. Analysis of principles and methods. 4 lectures.

ART 324 Intermediate Painting (3)

Painting methods and techniques with emphasis on form and composition. 6 hours activity. Prerequisite: Art 220 or permission of instructor. May be repeated for total of 9 units.

ART 325 Transparent Watercolor (3)

Methods and techniques with transparent watercolor. Outdoor sketching and studio projects. 6 hours activity. Prerequisite: Art 225 or permission of instructor. May be repeated for total of 9 units.

ART 327 Multimedia Painting (3)

Painting projects in mixed media. Discovering visual effects by combining traditional and nontraditional methods and techniques. 6 hours activity. Prerequisite: Art 220 or permission of instructor. May be repeated for total of 9 units.

ART 332 Pottery (3)

Basic methods of forming, decorating, glazing and firing pottery forms with an emphasis on use of the potter's wheel. 6 hours activity. May be repeated for a total of 9 units.

ART 334 Ceramics (3)

Intensified study of ceramic and sculptural forms; study of glaze calculation and firing processes. 6 hours activity. Prerequisite: Art 130 or permission of instructor. May be repeated for a total of 9 units.

ART 335 Raku (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 activity. Prerequisite: Art 130 or permission of instructor.

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 activity. 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 activity. Prerequisite: Art 242 or permission of instructor.

ART 344 Life Drawing (3)

Drawing for creative expression from studio models using variety of drawing materials. 6 hours activity. Prerequisite: Art 244 or permission of instructor. May be repeated for a total of 9 units.

ART 345 Expressive Drawing (3)

Advanced problems in draftsmanship with special emphasis on linear and textural expression. 6 hours activity. Prerequisite: Art 242 or permission of instructor. May be repeated for a total of 9 units.

ART 346 Drawing for Illustration (3)

Developing graphic images that accurately depict objects and situations. Communicating concepts through graphic media. 6 hours activity. Prerequisite: Art 244 or permission of instructor. May be repeated for a total of 9 units.

ART 352 Advanced Graphics (3)

Advanced projects in layout, corporate image and advertising design. 6 hours activity. Prerequisite: Art 251, 252 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 activity. Prerequisites: Art 251, 252.

ART 355 Graphic Design by Computer (3)

The use of personal computers in design, visual communication and fine arts. Emphasis on aesthetics in computer generated images created through the use of existing, menu-driven software and a variety of input devices. Prerequisite: Art 255. 6 hours activity. May be repeated once for credit.

ART 356 Video and Computer Generated Art (3)

Application of the computer and video systems in the development of fine arts images. Prerequisite: Art 355 or permission of instructor. 6 hours activity. May be repeated once for credit.

ART 361 Relief Printmaking (3)

Exploration of materials and processes in relief printing including block carving, collage and assemblage techniques. 6 hours activity. Prerequisite: Art 260 or permission of instructor. May be repeated for a total of 9 units.

ART 362 Advanced Screen Printing (3)

Advanced projects in screen printing. 6 hours activity. Prerequisite: Art 262 or permission of instructor. May be repeated for a total of 9 units.

ART 363 Intaglio Printmaking (3)

Techniques and skills in intaglio methods of printmaking including drypoint, etching, aquatint, mezzotint, and engraving. 6 hours activity. Prerequisite: Art 260 or permission of instructor. May be repeated for a total of 9 units.

ART 364 Lithography (3)

Techniques and skills in lithographic methods of printmaking on metal plates. 6 hours activity. Prerequisite: Art 242 and Art 260 or permission of instructor. Suggested: Art 345. May be repeated for a total of 9 units.

ART 381 Intermediate Sculpture (3)

Work in sculpture using variety of techniques and materials. 6 hours activity. Prerequisite: Art 280 or permission of instructor. May be repeated for a total of 9 units.

ART 387 Three-Dimensional Design (3)

Theory and application of aesthetic elements in three-dimensional forms. 6 hours activity. Prerequisite: Art 280 or permission of instructor. May be repeated for a total of 9 units.

ART 388 Gallery and Exhibition Design (3)

Professional practices in gallery exhibition design and installation. 6 hours activity. Prerequisite: Art 288 or permission of instructor. May be repeated for a total of 9 units.

ART 391 Fibers (3)

Fiber as a sculptural medium. Includes techniques of carding, spinning, and dyeing. 6 hours activity. Prerequisite: Art 190 or permission of instructor. May be repeated for a total of 9 units.

ART 395 Crafts Design (3)

Development of concepts, methods, and skills in basic craft media such as clay, wood, metal, and fiber construction. 6 hours activity. Prerequisite: Art 190 or permission of instructor. May be repeated for a total of 9 units.

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 and the Child (4)

Understanding the development of visual language and perception through study of children and their art. 4 lecture/discussion.

ART 413 Special Issues in Contemporary Art (4)

An investigation into special issues in contemporary painting, sculpture, architecture, video, performance. 4 hours seminar. Prerequisites: Art 214, 312 or 313 or permission of instructor.

ART 415 Gallery Studies (4)

Scholarly research for gallery publications and exhibitions; curatorial studies. 4 lecture/presentation. Prerequisites: Art 312 or 313 or permission of instructor. May be repeated once for credit.

ART 424 Advanced Painting—Acrylic (3)

Advanced methods and techniques in acrylic media and compositional development. 6 hours activity. Prerequisite: Art 324 or permission of instructor. May be repeated for a total of 9 units.

ART 425 Advanced Watercolor (3)

Advanced techniques in wet, cross wash and compositional development. 6 hours activity. Prerequisite: Art 225, 325 or permission of instructor.

ART 428 Advanced Painting (3)

Advanced work in relationship of form to idea. Greater development of personal imagery and paint materials. 6 hours activity. Prerequisite: Art 345 and Art 424 or permission of instructor. May be repeated for a total of 9 units.

ART 430 Advanced Ceramics (3)

Advanced work in ceramic sculpture and design in clay. 6 hours activity. Prerequisite: Art 332 or 334 or permission of instructor. May be repeated for a total of 9 units.

ART 453 Advanced Design (3)

Advanced projects in two-dimensional design. 6 hours activity. Prerequisite: Art 253 or permission of instructor. May be repeated once for credit.

ART 456 Motion Graphics: Computer Assisted Design (3)

Motion graphics/video and computer for advanced computer graphics course emphasizing the creation of images in motion as may be used in visual communications, entertainment, advertising and fine arts. 6 hours activity. Prerequisite: Art 355, CS 101 or CS 105 or CIS 110. May be repeated once for credit.

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 484 Advanced Sculpture (3)

Intensified study of sculpture with emphasis on new developments in sculptural media. 6 hours activity. Prerequisite: Art 381 or permission of instructor. May be repeated for a total of 9 units.

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

One of the three majors offered in the Behavioral Sciences Department is *Behavioral Sciences.* For other programs in this department, see Psychology and Sociology.

Nancy J. Harkey, *Chair*

Sonia L. Blackman	William Larson	Joseph L. Philbrick
Wayne C. Brown	Marcia E. Lasswell	Donald V. Shupe
Gary A. Cretser	Joseph J. Leon	Susan Siaw
Larry Goldman	Fredrick B. Meeker	Felicia F. Thomas
Barbara K. Goza	David G. Null	Wayne S. Wooden
Louis J. King	Fernando Parra	

The department offers courses leading to the degree of Bachelor of Arts in the Behavioral Sciences. The 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 major is intended to provide a background for understanding human behavior, in both individual and collective aspects, as well as from multi-cultural perspectives. The interdisciplinary orientation and offerings allow the student to select a major curriculum in concert with faculty advisors which best supports his/her aspirations for post-college employment or advanced education. A minimum number of required courses has been established, in order that a high degree of flexibility can be achieved in personal curriculum planning, with approved electives selected through consultation with faculty advisors. The introductory courses in psychology and sociology are prerequisite to most of the upper division offerings.

The department also offers minors in Psychology, Sociology, and Criminal Justice and Corrections. The Psychology and Sociology minors are not open to students with the Behavioral Sciences major. For more information on these minors see the Psychology and Sociology majors in this catalog. Behavioral Sciences majors *may* minor in Criminal Justice.

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 department office.

Since Behavioral Sciences is an interdisciplinary major drawn from Psychology and Sociology, students may not double major in Behavioral Sciences and either of these other two majors. The minor in Criminal Justice and Corrections, however, *may* be taken by Behavioral Sciences majors.

SINGLE SUBJECT WAIVER

The Behaviorial Sciences Department offers this program in conjunction with the Behavioral Sciences major. Waiver programs provide subject area competence for students interested in secondary school teaching as a career. (The name "waiver" comes from the fact that graduation from such a program waives a comprehensive competency exam in the subject area that would otherwise be required after graduation.) The waiver program in this department provides competence in the general area of social sciences. It requires, in addition to the major courses in Psychology and Sociology, courses in such areas as History, Georgraphy and Economics. Some of these may be taken in fulfillment of the major, some in fulfillment of General Education requirements, and the remainder as electives. The list of courses for the waiver program is given below, grouped as courses in the major, courses in general education and courses to be taken as free electives. For further information on the requirements for the teaching credential in secondary education, see the School of Education program in this catalog.

PHYSIOLOGY MINOR

The Physiology Minor is an interdisciplinary program which can be elected by students majoring in any field. Its purpose is to improve the training and advising of students in order to facilitate their pursuit of careers in biomedical fields utilizing a knowledge of Physiology. It is particularly appropriate for students majoring in Behavioral Sciences.

A full description of the minor is located in the "University Programs" section of this catalog.

QUANTITATIVE RESEARCH MINOR

The Quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Behavioral Sciences. A full description of this minor is included in the "University Programs" section of this catalog.

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	
Senior Seminar	BHS	498	(4)

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)

Approved electives in BHS, (except for 400 and 499), PSY, SOC, ANT, 300-400 level chosen in consultation with advisor ..... (20)

SUPPORT AND ELECTIVE COURSES

Freshman English I	ENG	104	(4)
Logic and Semantics	PHL	202	(4)
Public Speaking	COM	100	(4)
Writing for the Profession	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)

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)
Prin. of Management	MHR	301	(4)
Industrial & Personnel Psychology	PSY	332	(4)
2. Public Administration	PLS	314	(4)
The American Federal Judiciary	PLS	327	(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 Law Violators	SW	318	(4)
Probation & Parole	SW	320	(4)

The student selects four other upper division courses, in consultation with an advisor, from areas 1 thru 5 and courses listed below:

Special Projects (Visto Interns)	BHS	400	(2-6)
Writing for the Profession	ENG	301	(4)
Philosophy of Freedom and Order	PHL	410	(4)
Philosophy of Justice	PHL	415	(4)
Bureaucracy & Administrative Behavior	PLS	316	(4)
Criminal Justice System	PLS	404	(4)
Adolescent Psychology	PSY	312	(4)
Human Relations I	PSY	314	(4)
Psychology of Identity	PSY	321	(4)
Ethnic Relations	SOC	320	(4)
or Sociology of Minority Communities	SOC	323	
Domestic Violence	SW	322	(4)

Total units required in minor ..... (32)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Note: The Minor in Criminal Justice and Corrections may be taken by Behavioral Science Majors.

SOCIAL SCIENCES WAIVER PROGRAM

Courses in Major Core	SOC 201	Principles of Sociology	4
	SOC 310	Social Organization	4
	PSY 203	Principles of Psychology II	4
	PSY 401	Social Psychology	4
			16
Approved Electives in Major	SOC 401	Urban Sociology	4
			4
Support Electives in Major	PLS 320	Political Change in Contemporary America	4
	GEO 312	Economic Geography	4
			8
General Education Courses			
CAT IIIB	HST 101	History of Civilization: The Ancient World	4
CAT IVA either	EC 201	Principles of Economics	4
or	EC 202	Principles of Economics	4
CAT IVB	ANT 102	Intro to Cultural Anthropology	4
CAT IVC	PLS 202	Comparative Political Systems	4
CAT VI	HST 202	U.S. History	4
	PLS 201	Introduction to American Government	4

Courses to complete Waiver	HST 201	U.S. History	4
	HST 370	California	4
	HST 102	History of Civilization: The Middle Period	4
	HST 103	History of Civilization: The Modern World	4
	GEO 101	Physical Geography	4
			20
Total units			72

Course Descriptions

BHS 110 PC Basics for BHS (2)

Basic introduction in the use of proprietary and CSU site-licensed word processing and data analysis programs for the Behavioral Sciences. Methods of data entry, description, and analysis of both large data sets and smaller data sets including PC production of brief research reports and other professional manuscripts.

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 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. Prerequisite: PSY 201, SOC 201, or EWS 145.

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, or practicum in selected problem areas. Total credit limited to 6 units with a maximum of 2 units per quarter.

BHS 426 Applied Social Psychology/Sociology (4)

Application of methods, concepts and content of sociology and psychology in various settings, including health systems, government agencies, industry and education. Examination of the effects of culture, ethnicity, gender on the effective delivery of services. Three seminar-discussions, one two-hour activity. Prerequisites: BHS 204, 205 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.

COMMUNICATION

T. Harrell Allen, *Chair*
Robert L. Charles
David A. Church
Vinita Dhingra
Prudence Faxon
Ross F. Figgins
David C. Henley
Gary D. Keele
Patrica A. Kurtz
Mary-Ann Leon
Glen D. Phillips
Judith A. Sanders
Alfred E. Sheldon
Elizabeth Tarnove
Stanley H. Taylor

A society, becoming increasingly more and more complex, needs individuals to inform, explain, and interpret its problems, its issues. The Communication major prepares students to fill communication positions in the mass media, business, government, and education.

Five Options are offered—Telecommunications, Journalism, Public Relations, Organizational Communication, and Specialized Communication.

Telecommunications is designed for students primarily interested in careers in the radio and television broadcasting industry.

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.

The department offers minors in Communication, Newspaper Journalism, Public Relations, and Speech Communication.

The Communication Department sponsors the twice-weekly student newspaper *The Poly Post*, the quarterly student magazine *Opus* and the student Forensic Team.

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)

TELECOMMUNICATIONS

Intro to Telecom	COM	205	(4)
Intro to Film	COM	241	(4)
Intro to Visual Communication	COM	242	(4)
Audio Communications	COM	253	(4)
Broadcast Jrnl	COM	301	(4)
Broadcast Regulations	COM	323	(4)
Adv. Video Production	COM	442	(4)
Intermediate Vis. Com.	COM	342	(4)

Choose two courses from the following:

Media Effects	COM	370	(4)
Broadcast Media Criticism	COM	448	(4)
Telecom Seminar	COM	460	(4)

JOURNALISM

Reporting	COM	102	(4)
Advanced Reporting	COM	202	(4)
Photojournalism	COM	231	(4)
Com Law	COM	304	(4)
Editing Lab	COM	305	(2)
Rep. Public Affairs	COM	309	(4)
Public Opinion, Prop	COM	413	(4)

One of the following combinations:

Magazine Editing and Production	COM	312	(4)
In Depth Reporting	COM	307	(4)
Business and Economic Reporting	COM	308	(4)
Constitution and Media	COM	322	(4)
OR			
Audio Communication	COM	253	(4)
or Multi-Media Communication	COM	333	
or Intermediate Visual Com.	COM	342	
Broadcast Journalism	COM	301	(4)
Broadcast Regulation	COM	323	(4)
Advanced Broadcast Jrnl	COM	411	(4)

PUBLIC RELATIONS

Reporting	COM	102	(4)
Photography	COM	131	(4)
Advanced Reporting	COM	202	(4)
Print Communication	COM	206	(4)
Adv. Copy, Layout, & Media	COM	302	(4)
Communications Law	COM	304	(4)
Magazine Edit. & Prod.	COM	312	(4)
Public Relations Theory	COM	313	(4)
Public Relations Tools & Techniques	COM	315	(4)
Public Relations Case Studies	COM	414	(4)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

SPECIALIZED COMMUNICATION

Communication Research	COM	316	(4)
Comm Problem Analysis	COM	321	(4)
Minimum of 16 units in COM at least 8 must be lower division. Not to include any G.E. or other required and/or support and directed courses in COM			(16)
Other courses at 300–400 level, university-wide, by contract with approval of adviser			(16)

ORGANIZATIONAL COMMUNICATION

Interpersonal Com	COM	103	(4)
Business Com	COM	218	(4)
Group Discussion	COM	337	(4)
Public Rels. Theory	COM	313	(4)
Org. Com Theory	COM	314	(4)
Com Research	COM	316	(4)
Com Problem Analysis	COM	321	(4)
Org. Com Analysis	COM	358	(4)
Com Field Studies/Analy	COM	402	(4)
Org Com Seminar	COM	462	(4)

SUPPORT & ELECTIVE COURSES

(Required in specified options)

TELECOMMUNICATIONS

Reporting	COM	102	(4)
Photography	COM	131	(4)
Basic Keyboarding	MHR	144	(2)
or Prof Exam			
Methods Behav Sci	BHS	204	(4)
or Intro Research Mthd	PLS	205	
Com Law	COM	304	(4)
Org. Com	COM	314	(4)
Multi Media	COM	333	(4)
or Advanced Broadcast Journalism	COM	411	
Com Ethics	COM	401	(4)
or The Documentary	COM	431	

JOURNALISM

Photography	COM	131	(4)
Com Ethics	COM	401	(4)
Newspaper Practices	COM	251	(6)
or Magazine Practices	COM	252	
or Advanced News Practices	COM	351	
or Advanced Magazine Practices	COM	352	
or a combination of the above courses totaling six units (each course 2 units)			
Print Communication	COM	206	(4)
Principles of Economics	EC	202	(4)
Public Finance	EC	410	(4)
or Money/Banking	EC	308	
Advanced Expository Writing	ENG	303	(4)
Basic Keyboarding	MHR	144	(2)
or Prof Exam			
Intro. to Research Methods	PLS	205	(4)
or Meth in Beh Sci	BHS	204	
Advanced Copy, Layout	COM	302	(4)
Intro. to Visual Com.	COM	242	(4)
Amer. State & Loc. Pol.	PLS	328	(4)

PUBLIC RELATIONS

Intro to Visual Communication	COM	242	(4)
In-Depth Reporting	COM	307	(4)
Public Relations Writing	COM	319	(4)
Com Ethics	COM	401	(4)
Pub Opin, Prop	COM	413	(4)
Prin of Econ	EC	202	(4)
Basic Keyboarding	MHR	144	(2)
or Prof Exam			
Bus & Ec Reporting	COM	308	(4)
Research Tech Pol Sci	PLS	205	(4)
or Methods Behav Sci	BHS	204	
Editing Lab	COM	305	(2)

SPECIALIZED COMMUNICATION

Basic Keyboarding	MHR	144	(2)
or Proficiency Exam			
Choose 2 courses from the following:			
Reporting	COM	102	(4)
Report Writing	COM	216	(4)
Business Communication	COM	218	(4)
Technical Writing	COM	219	(4)
Choose 1 from the following:			
Interpersonal Com	COM	103	(4)
Persuasion and Com	COM	325	(4)
Group Discussion	COM	337	(4)
Choose 1 from the Following:			
Business & Economic Reporting	COM	308	(4)
Organizational Com Theory	COM	314	(4)
Language in Govt and Industry	COM	320	(4)
Intercultural Com.	COM	327	(4)

Minor or minimum of 30 units outside of COM, selected with prior approval of advisor.

ORGANIZATIONAL COMMUNICATION

Principles of Psy II	PSY	203	(4)
Principles of Econ	EC	202	(4)
Intro to Visual Communication	COM	242	(4)
Methods in the Behv Sci	BHS	204	(4)
or Intro Research Methds	PLS	205	
Prin. of Management	MHR	301	(4)
Org Behv in Multi-Cultural Environment	MHR	318	(4)
PLUS 16 Units selected from one group			
Industrial & Personnel	PSY	332	(4)
Social Psychology	PSY	401	(4)
Applied Social Psy/Soc	BHS	426	(4)
Psychological Testing	PSY	416	(4)
OR			
Human Resources Mangt	MHR	311	(4)
Admin Sys & Technologies	MHR	401	(4)
Administrative Systems Development	MHR	402	(4)
Training & Development	MHR	405	(4)
OR			
Marketing of Services	MKT	316	(4)
Professional Selling	MKT	208	(4)
Principles of Mkt Mangt	MKT	301	(4)
Advertising Principles	MKT	307	(4)

MINORS

May not be taken by Communication Majors

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	COM	100	(4)

Select one of the following:

Photography	COM	131	(4)
Introduction to Visual Communication	COM	242	(4)
Interpersonal Communication	COM	103	(4)
Advocacy and Argument	COM	204	(4)

Select one of the following:

Public Relations Theory	COM	313	(4)
Language in Government and Industry	COM	320	(4)
Human Communication Theory	COM	328	(4)

Select one of the following:

Communications Law	COM	304	(4)
Public Opinion, Propaganda and the Mass Media	COM	413	(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 Visual Communication	COM	242	(4)
In-Depth Reporting	COM	307	(4)
Public Relations Theory	COM	313	(4)
Public Relations Tools & Techniques	COM	315	(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	COM	100	(4)
or Interpersonal Communication	COM	103	
Advocacy and Argument	COM	204	(4)
Human Communication Theory	COM	328	(4)
Group Discussion	COM	337	(4)
Public Opinion, Propaganda and the Mass Media	COM	413	(4)
Small Group Communication	COM	339	(4)
Total Units Required			(24)

Course Descriptions

COM 100 Public Speaking (4)

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

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 and MHR 144 or typing proficiency certificate or permission of instructor.

COM 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/problem-solving.

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 155 Debate Theory and Practice (2)

Introduction to reasoning and argument through formal debates. Selection and phrasing of propositions, debate formats, gathering and testing of evidence, case construction, skills of refutation, cross examination and theoretical concepts of debate will be developed by debating. 2 lecture/problem-solving.

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 Advanced 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 and MHR 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 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/problem-solving.

COM 205 Introduction to Telecommunications (4)

The foundation course for the study of telecommunications. Historical aspects and the economic and societal impact of telecommunications technologies. 4-lecture/presentation.

COM 206 Print Communication (4)

Introduction to the principles and theory of typography, layout, and production of material for the print industry. Work with Macintosh computers and learn elements of desktop publishing, including word processing, graphic design, and page composition.

COM 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.

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 Visual Communication (4)

Introduction to visual communication. The language of television and film in both its rhetorical and practical aspects. Students will become familiar with broadcast studio production techniques as they illustrate rhetorical visual concepts. 2 one-hour lecture/problem-solving; 2 two-hour activities.

COM 251 Newspaper Practices (2)

Newspaper laboratory for beginning newspaper staff members. For students interested in gaining practical newspaper experience. Minimum of 4 hours of activity a week. Prerequisite: permission of instructor. Total credit in COM 251, 252, 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, 254 limited to 6 units.

COM 253 Audio Communication (4)

The theoretical and practical aspects of audio communication involving the exploration of the potential of sounds, music and the spoken word for communication. 2 one-hour lecture/problem-solving and 2 two-hour activities.

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, 254 limited to 6 units.

COM 255 Forensics Practices I (2)

Activity course for advanced students in public speaking and debating. Independent projects in debate, persuasive speaking, oral interpretation or other activities associated with the University's Forensics program. Minimum 4 hours activity. May be repeated for up 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 Broadcast Journalism (4)

Gathering and writing of news for the Broadcast Media. Introduction to broadcast news production. Beginning field production. 2 lectures/problem solving; 2 two-hour activities. Prerequisites: COM 102, COM 242.

COM 302 Advertising Copywriting, Layout and Production (4)

Examination of advertising and specific creative problems in various media. Preparation of copy, planning and layout, and study of media as related to creativity. 2 lectures, 2 two-hour activities. Prerequisites: COM 206 or permission of instructor.

COM 304 Communications Law (4)

Constitutional, statutory and case law governing freedom of speech and press, libel, privacy, journalist's confidential sources, subpoena, search warrant, contempt, newsgathering and freedom of information, free press and fair trial, obscenity, and access to the media. Prerequisite: COM 101 and COM 203. 4 lecture-case study.

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. Students required to research background for story assignments. 4 lecture/problem solving.

COM 308 Business and Economic Reporting (4)

Gathering materials and writing stories, reports pertaining to business and economics. 4-lecture-discussion. Prerequisite: EC 201, 202; COM 202.

COM 309 Reporting Public Affairs (4)

Gathering material and writing newspaper stories pertaining to government and courts; emphasis on organization and procedure of governmental institutions. Students required to research background for story assignments. 4 lecture/problem solving.

COM 310 Editorial Writing (2)

Writing editorials; emphasis on the use of editorial comment. 2 lectures. Prerequisite: COM 102.

COM 312 Magazine Editing and Production (4)

Analysis and history of various types of publications produced in magazine format. Class works on design and production of several magazine-styled publications using the latest in computer technology and desktop publishing software. Includes lectures, demonstrations and critiques of student projects. 4 lecture/problem solving. Prerequisites: COM 102, COM 131, COM 206, COM 305, COM 304 (or concurrent enrollment in COM 304).

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 Tools and Techniques (4)

The importance and use of public relations tools including the methods of producing press releases, public service announcements for radio and television, press kits, house organs and public relations materials. 4 hour lecture/problem-solving. Prerequisites: COM 102 and COM 313.

COM 316 Communications Research (4)

Research methods used to measure the content, process and effects of communications on attitudes, knowledge and behavior. Research design, data analysis and evaluation in quantitative and qualitative communication research methodology. 2 lecture/problem-solving/two 2-hour activities.

COM 319 Public Relations Writing (4)

Examines the format and style for writing public relations materials. Emphasis on writing the various types of public relations copy. 4 lecture/problem-solving. Prerequisite: COM 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, journalists' 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, 203, 304.

COM 324 Communication Skills in Job Search (4)

Identifying career objectives, researching the employment market, networking, preparing a professional application package, interviewing and decision-making; emphasis on individual adaptation of student's background. Includes interest/career testing. 4 lecture-discussion. Prerequisite: ENG 105 or COM 114 or permission of instructor.

COM 325 Persuasion and Communication (4)

Persuasion is examined as affected by messages in various communication contexts. The process is studied through differing aspects of source, channel(s) and receiver(s). Emphasis on contributions from behavioral theorists. 4 lectures/presentations.

COM 326 Modern Philosophers on Persuasion (4)

Philosophy of persuasion is analyzed by reading key contemporary authors as to their basic assumptions that undergird any particular theory of rhetoric and communication. Authors, including Richards, Weaver, Burke, McLuhan, will be used. 4 lecture/presentations. Prerequisite: COM 201.

COM 327 Intercultural Communication (4)

Course examines the role of communication in a multi-cultural context. Through lectures and problem-solving exercises students explore the ways in which cultural differences impact various kinds of communicative interations, including interpersonal, organizational, and international settings. Significant writing. 4 lecture/problem solving.

COM 328 Human Communication Theory (4)

An interdisciplinary, behaviorally oriented examination of the constituent processes of human communication. 4 lectures/problem-solving. Prerequisite: COM 100 or COM 204 or permission of instructor.

COM 329 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.

COM 333 Multi-Media Communication (4)

The theoretical and practical use of various media techniques for communication in journalistic, public relations and organizational areas. Course combines conceptual elements with practical illustrations, including video tape, slides, and photographs. 2 one-hour lecture/problem-solving and 2 two-hour activities. Prerequisites: COM 102, COM 131, COM 242.

COM 337 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/problem-solving.

COM 339 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: COM 337 or PSY 314.

COM 342 Intermediate Visual Communication (4)

Continuation of analysis of visual communication in both practical and theoretical terms. Utilization of video production skills for processes of informing, persuading and entertaining. 2 one-hour lectures; 2 two-hour laboratories. Prerequisite: COM 242.

COM 351 Advanced Newspaper Practices (2)

Newspaper laboratory for experienced reporters and newspaper staff members. For students wanting practical experience working in print media. Minimum of 4 hours of activity a week. Prerequisite: permission of instructor. Total credit in COM 351, 352, 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, 354 limited to 6 units.

COM 354 Intermediate T.V. 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, 354 limited to 6 units.

COM 355 Forensics Practices II (2)

Activity course for advanced students in public speaking and debating. Independent projects in debate, persuasive speaking, oral interpretation or other activities associated with the University's Forensics program. Minimum 4 hours activity. May be repeated for up to 6 units.

COM 358 Organizational Communication Analysis (4)

A review of strategies and instruments used in the analysis of communications in organizations. Topics covered will include climate surveys, needs assessments, evaluations, communication audits, organizational development strategies and speak-out programs. 2 lecture/problem-solving/two 2-hour activities.

COM 370 Media Effects (4)

Effects of television, radio, print and other telecommunications media on society; their significance as social institutions. 4 Lecture/Presentation.

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. Prerequisites: COM 101 and 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 409 Communication in Conflict Resolution (4)

The role of communication in the productive settlement of interpersonal and organizational disputes. The course examines effective communication strategies used in negotiation and bargaining situations. 4 hours lecture/problem-solving. Prerequisites: COM 103, COM 314 or permission of the instructor.

COM 411 Advanced Broadcast Journalism (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. Prerequisites: 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)

Discussion of current public relations practices in businesses and institutions; development of public relations campaigns for specific situations. 4 hours discussion. Prerequisites: COM 313, 315.

COM 415 Public Relations Seminar (4)

Student study of the role of PR in contemporary society. Topics include ethics management, research and evaluation, and trends in the profession. 4 seminar/discussions. Prerequisites: COM 313 and senior standing.

COM 431 The Documentary (4)

Principles and techniques of the documentary film and video in mass communications. 2 lecture/discussion, 2 two-hour activities.

COM 442 Advanced Visual Communication (4)

Continuation of rhetorical and applied work in the visual media. Emphasis on the pre-production process both in terms of visual and practical concepts. 2 one-hour lecture/problem-solving; 2 two-hour activities. Prerequisites: COM 242, COM 342.

COM 444 International Public Relations (4)

The study of public relations as practiced in other countries with an examination of the reasons for growth and future possible developments. 4 hour lecture/discussion. Prerequisite: COM 313.

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 laboratory for students who wish experientially based guidance in newspaper editorial and management practices. Minimum of 4 hours of production activity. Prerequisite: permission of instructor. Total credit hours in COM 451, 452, 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, 454 limited to 6 units.

COM 454 Advanced TV Practices (2)

Advanced Video Production course. Minimum of 6 hours of production activity a week. Prerequisites: 2 units of COM 254, 354, and permission of instructor. Total credit in COM 254, 354, and 454 limited to 6 units.

COM 455 Forensics Practices III (2)

Activity class designed to provide experience for students interested in becoming teachers of speech at the junior high, high school, or collegiate level. Emphasis on speaking evaluation.

COM 460 Telecommunications Seminar (4)

Role of Telecommunications in contemporary society. Ethics, social responsibility and trends in this emerging profession. 4 hour seminar/discussion.

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. Mandatory. No credit.

COM 462 Organizational Communication Seminar (4)

Review and discussion of current issues and topics in organizational communication. Students review and discuss literature and present oral and written reports. 4 hour seminar/discussion.

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.

ECONOMICS

Sidney M. Blumner, *Chair*
Taha Al-Sabea
Robert T. Bray
Maureen Burton
George T. Galbreath
Franklin Y. H. Ho
David G. Jaques
David J. Park
Lynda M. Rush
Mohammad R. Safarzadeh
John T. Shieh
Laurence Shute
Dale G. Stallings
James E. Sutton

The department serves all schools 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 of 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.

Quantitative Research Minor

The quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Economics. A full description of this minor is included in the "University Programs" section of this catalog.

CORE COURSES FOR MAJOR *

(Required of all students)

Principles of Economics	EC	201	(4)
Principles of Economics	EC	202	(4)
Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
Economic Statistics	EC	321	(4)
Economic Statistics	EC	322	(4)

Completion of COM 216 (See Support Classes) or permission of instructor to enter upper division classes.

Track A Core Classes

Money and Banking	EC	308	(4)
Intermediate Micro Theory	EC	311	(4)
Distribution of Income	EC	312	(4)
Intermediate Macro Theory	EC	313	(4)
Development of Economic Doctrine	EC	407	(4)
Senior Seminar	EC	462	(4)
Senior Seminar	EC	463	(4)
Advanced Economics (400 level)			(32)
or Advanced Economics			(28)
and Advanced Math (Calculus and above)			(4)

Track B Core Classes

Money and Banking	EC	308	(4)
Intermediate Micro Theory	EC	311	(4)
Distribution of Income	EC	312	(4)
Intermediate Macro Theory	EC	313	(4)
Intro to Math Economics	EC	406	(4)
Development of Economic Doctrine	EC	407	(4)
Intro to Econometric Methods	EC	421	(4)
Senior Seminar	EC	462	(4)
Senior Seminar	EC	463	(4)
Analytical Geometry & Calculus	MAT	114	(4)
Analytical Geometry & Calculus	MAT	115	(4)
Advanced Economics (400 level)			(16)

SUPPORT & ELECTIVE COURSES

(Required of all students)

Report Writing	COM	216	(4)
Freshman English II	ENG	105	(4)
PE, 100 series #			(2)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Not required if CPU 201 (Category V of GE) is taken.

GENERAL EDUCATION

(72 units) Pick courses from approved lists unless specified.

Category I: (follow Pattern 1)
- A. Freshman English I ..... ENG 104 (4)
- B. Public Speaking ..... COM 100 (4)
- C. Logic & Semantics ..... PHL 202 (4)

Category II:—16 units
- A. Introduction to Statistics ..... STA 120 (4)
- B. Any course ..... (4)
- C. Any course ..... (4)
- D. Any course ..... (4)

Category III: (one course from each area) ..... (12)
Category IV: (one course from each area) ..... (12)
Category V: any course ..... (4)
Category VI: any pattern ..... (8)
Category VII package may include a 400-level Economics class which would also satisfy Cat. IV-A. ..... (8)

ECONOMICS MINOR

Principles of Economics ..... EC 201 (4)
Principles of Economics ..... EC 202 (4)
Money & Banking ..... EC 308 (4)
Intermediate Micro Theory ..... EC 311 (4)
Distribution of Income ..... EC 312 (4)
Intermediate Macro Theory ..... EC 313 (4)
The student must also select 8 units from the following:
Economic Statistics ..... EC 321 (4)
Economic Statistics ..... EC 322 (4)
International Trade ..... EC 404 (4)
International Finance ..... EC 405 (4)
Development of Economic Doctrine ..... EC 407 (4)
Public Finance ..... EC 410 (4)
Economic Development ..... EC 411 (4)
Comparative Economic Systems ..... EC 412 (4)
Economic History of Europe ..... EC 413 (4)
Economic History of the U.S. ..... EC 409 (4)
Labor Economics ..... EC 414 (4)
Labor Problems and Practices ..... EC 415 (4)
Manpower Economics ..... EC 416 (4)
Land Economics ..... EC 419 (4)
Introductory Econometric Methods ..... EC 421 (4)
Economic Forecasting ..... EC 422 (4)
Economic Programming & Optimization Analysis ..... EC 423 (4)
Managerial Economics ..... EC 424 (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)
Seminar in Environmental 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 and 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 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)

Student investigation of the role of prices in final output markets; principles of production; and business behavior under various 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)

Student investigation and presentation of the 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 lecture/problem-solving sessions. Prerequisite: STA 120 or an equivalent MAT statistics course or permission of instructor. Prerequisite for EC 322: Successful (C or better) completion of EC 321 or its equivalent.

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. Prerequisite: EC 201 and EC 202 or permission of instructor.

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 and EC 202, or permission of instructor; EC 311 recommended.

EC 405 International Finance (4)

Topics in international liquidity and finance theory. Problems of the international monetary system. 4 lecture-discussions. Prerequisite: EC 201, 202 and EC 404 or permission of instructor; EC 313 recommended.

EC 406 Introduction to Mathematical Economics (4)

Mathematical description and derivation of micro- and macro-economic theory. 4 hours lecture-discussion. Prerequisites: EC 201 and 202 and one of the following: MAT 114 or MAT 125 or MAT 130 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-discussions. Prerequisite: EC 201 and 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 and EC 202, or permission of instructor.

EC 410 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 411 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 201 and EC 202 or permission of instructor.

EC 412 Comparative Economic Systems (4)

Examination of alternative economic organizations, ranging from free enterprise to fully planned economies. 4 lecture-discussions. Prerequisite: EC 201 and EC 202, or permission of instructor."

EC 413 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 and 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 201 and 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 201, 202, and 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 and 202, or permission of instructor.

EC 419 Seminar in Land Economics (4)

Analysis of the utilization and conservation of land; urban land uses; market forces; factors affecting the locations of enterprises; and patterns of urban and regional growth. 4 hour seminar. Prerequisites: EC 201 or EC 202, or permission of instructor.

EC 421 Introductory Econometric Methods (4)

Introductory course in econometric problem-solving techniques. Students required to do quantitative model building; estimation, verification, and prediction of economic variables in class exercises. 4 lectures, problem-solving sessions. Prerequisites: EC 321 and 322, or equivalent are required; EC 308, 311, 312 and 313 strongly recommended.

EC 422 Economic Forecasting (4)

Techniques and procedures of statistical analysis of macroeconomic and microeconomic conditions. In-class exercises emphasize problem-solving, forecasting and model-building methods. 4 lectures, problem-solving sessions. Prerequisites: EC 321, 322, and 421 or equivalent or permission of instructor.

EC 423 Economic Programming & Optimization Analysis (4)

Optimization analysis and programming techniques, including linear and nonlinear methods. Students work on case studies, deterministic model-building. Application of computer facilities and programming. 4 lectures, problem-solving sessions. Prerequisites: EC 201, 202 and 406 or permission of instructor.

EC 424 Managerial Economics (4)

Quantitative analytical methods in formulating business decision models. Integrated application of economic and operations analysis to managerial problem-solving and decision-making processes, involving in-class exercises. 4 lectures, problem-solving sessions. Prerequisites: EC 201 and 202, or permission of instructor.

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 and 202 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 201, 202, and 410 or permission of instructor.

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 and EC 202, or permission of instructor.

EC 432 Seminar in Urban Economics (4)

Analysis of the distribution and stability of income in urban areas; economic development of California cities; physical distribution and urban transportation problems. 4 hour seminar. Prerequisites: EC 201 or 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 or 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 or EC 202, or permission of instructor.

EC 435 Seminar in Environmental Economics (4)

Discussion of economic trade-offs involved with the environment. Topics covered include: property rights; air, water and land pollution; toxic wastes; nuclear wastes. 4 hours seminar. Prerequisites: EC 201 or 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 201 or 202 or permission of instructor.

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 or 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 or 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 and 308, or permission of instructor.

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: EC 321, 322, 311 and 313.

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 and 202 or permission of instructor.

EC 497 Economics of Underrepresented Groups (4)

Economic analysis of the problems of underrepresented in the urban communities. Distribution and stability of their income. Economic effects of discrimination. Federal, state, and local programs. Alternative solutions to present problems. 4 lecture-discussions. Prerequisite: EC 201 and 202 or permission of instructor.

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: EC 201 and 202 or 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

Victor N. Okada, *Chair*

Samuel I. Bellman
Leo W. Berg
Stanley J. Cook
Thomas J. Elliott
Joseph R. Farrell
David J. Fite
Barbara I. Gill
Trinidad Gonzalez
Nancy Gray
Susana Hernandez-Araico
Carol R. Holder
Theodore C. Humphrey
Carola M. Kaplan
Deirdre E. Lashgari
Harold P. Levitt
John R. Maitino
William McAdams
Caryl McNees
Ahmed M. Metwalli
Robert E. Morsberger
Andrew Moss
Larry K. Robinson
Edward L. Rocklin
Sidney Shrager
Ben Siegel
Anne B. Simpson
Mary Sisney
George Stavros
Joseph H. Stodder
Richard W. Suter
Carlo Testa
Frank I. Torres
Stephen V. Whaley

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. Students who complete the core courses required for the B.A. in English will have completed the waiver program for the single subject credential in English. 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 composition and in the methods of reading literature; in the sophomore year a broad survey of English and American literature and world literature; in the junior year a study of linguistics and the principal genres; and in the senior year relatively intensive work in individual authors or small groups of authors.

In addition, the department lists elementary and intermediate sequences in French, German, and Spanish language and culture, and elementary sequences in Greek, Latin, and Russian 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 minor in English, 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)

Advanced Expository Writing	ENG	303	(4)
Grammar of Modern English	ENG	321	(4)
Literary Theory	ENG	350	(4)
Shakespeare	ENG	404	(4)

Four of the following (must include one British, one American, one World Literature):

Survey of British Literature I	ENG	207	(4)
Survey of British Literature II	ENG	208	(4)
Survey of American Literature I	ENG	211	(4)
Survey of American Literature II	ENG	212	(4)
World Literature I	ENG	217	(4)
World Literature II	ENG	218	(4)

Two of the following:

Novel in English to 1880	ENG	305	(4)
Modern British Novel	ENG	306	(4)
English Drama to 1890	ENG	307	(4)
Modern Drama	ENG	308	(4)
English Poem	ENG	309	(4)

Two of the following:

Language and Human Behavior	ENG	313	(4)
Structure of Language	ENG	320	(4)
Development of Modern English	ENG	322	(4)

Two of the following:

Chaucer	ENG	401	(4)
Milton and His Contemporaries	ENG	402	(4)
Shakespeare	ENG	403	(4)

Eight units from the following:

English Renaissance	ENG	440	(4)
English Enlightenment	ENG	442	(4)
English Romanticism	ENG	444	(4)
Victorian Writers	ENG	448	(4)
American Renaissance	ENG	452	(4)
American Realism	ENG	454	(4)
Novel in the Modern World	ENG	458	(4)
Senior Paper	ENG	461, 462	(2)* (2)
Upper division units from departmental offerings			(12)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

GENERAL EDUCATION COURSES

(Required of all students)

Category I

a) Freshman English I	ENG	104	(4) †
b) Advocacy and Argument	COM	204	(4)
c) Writing about Literature	ENG	108	(4)

Category II (must include one laboratory science)

a) Select one course	(4)
b) Select one course	(4)
c) Select one course	(4)
d) Select one course	(4)

Category III

a) Select any course	(4)
b) Select any course	(4)
c) Select any course	(4)

Category IV

a) Select any course	(4)
b) Select any course	(4)
c) Select any course	(4)

Category V

Select any course	(4)

Category VI

American Civilization	AMC	201	(4)
or			
Intro to Am. Government	PLS	201	(4)
American Civilization	AMC	202	(4)
or			
US History	HST	202	(4)

Category VII (Upper Division)

Foundations of Mod. Art	ART	312	(4)
20th Cent. Brit. Lit.	ENG	450	(4)
or			
20th Cent. Am. Lit.	ENG	456	

UNRESTRICTED ELECTIVES.....34‡

† All foreign students and students with permanent resident status must take ENG 102 and 103 in lieu of ENG 104.

‡ 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 I	ENG	207	(4)*
Survey of British Literature II	ENG	208	(4)*
Survey of American Literature I	ENG	211	(4)*
Survey of American Literature II	ENG	212	(4)*

* Prerequisite: ENG 104 or equivalent

The student must select 24 units from the following (at least 12 units upper division):

Freshman English II	ENG	105	(4)
Writing about Literature	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)
Intro to Contemporary Literature	ENG	206	(4)
Survey of British Literature I	ENG	207	(4)
Survey of British Literature II	ENG	208	(4)
Survey of American Literature I	ENG	211	(4)
Survey of American Literature II	ENG	212	(4)
Latino Literature in America	ENG	215	(4)
The Bible as Literature	ENG	216	(4)
World Literature I	ENG	217	(4)
World Literature II	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	ENG	303	(4)
The Novel in English to 1880	ENG	305	(4)
The Modern British 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	ENG	320	(4)
Grammar of Modern English	ENG	321	(4)
Development of Modern English	ENG	322	(4)
Language Acquisition	ENG	323	(4)
Children's Literature	ENG	324	(4)
Adolescent Literature	ENG	326	(4)
Literary Theory	ENG	350	(4)
Chaucer	ENG	401	(4)
Milton and His Contemporaries	ENG	402	(4)
Shakespeare	ENG	403	(4)
Shakespeare	ENG	404	(4)
Literature of the Holocaust	ENG	420	(4)
English Renaissance	ENG	440	(4)
English Enlightenment	ENG	442	(4)
English Romanticism	ENG	444	(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)
The Novel in Modern World	ENG	458	(4)
Modern Critical Theory	ENG	460	(4)
Senior Paper	ENG	461	(2)
Senior Paper	ENG	462	(2)
Senior Seminar	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	FL	151	(4)
Elementary Spanish II	FL	152	(4)
Elementary Spanish III	FL	153	(4)

Lower division work is completed with three intermediate courses:

Intermediate Spanish	FL	251	(4)
Intermediate Spanish Reading	FL	252	(4)
Intermediate Spanish Conversation	FL	253	(4)
Intermediate Spanish Composition	FL	254	(4)

Three upper division courses are required, at least one of which must be from the first group:

1. Literature of Mexico	FL	351	(4)
Spanish-American Literature	FL	355	(4)
Spanish Golden Age Literature	FL	356	(4)
2. Spanish Civilization	FL	352	(4)
Latin American Civilization	FL	353	(4)
Contemporary Latin American Civilization	FL	354	(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 students' 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) in order to enroll. Does not count towards the bachelor's degree.

ENG 096 Basic Communication Skills (4)

Communication skills instruction at a more advanced level than ENG 095. Students required to take ENG 096 must pass course before enrolling in ENG 104. Passing grade in both reading and writing components required. 4 hours discussion. Students must take English Placement Test (EPT) or equivalent in order to enroll. Does not count towards the bachelor's degree.

ENG 097 Basic Communication Skills (4)

Review and practice of basic reading and writing skills. 4 lectures/problem-solving. Students required to take ENG 097 must pass course before enrolling in ENG 104. Prerequisite: ENG 096. Does not count towards the bachelor's degree.

ENG 098 Basic Skills for English as a Second Language (4)

Intensive work in listening, comprehension, reading, vocabulary, grammar, and writing for foreign students and permanent residents. 4 lectures/problem-solving. Students must take English Placement Test (EPT) to enroll. Does not count towards the bachelor's degree.

ENG 099 Basic Grammar and Writing for Speakers of English as a Second Language (4)

Intensive work in grammar and composition for speakers of English as a second language. 4 lectures/problem-solving. Students must take English Placement Test or equivalent to enroll. Does not count towards the bachelor's degree.

ENG 102 College Composition for Speakers of English as a Second Language (4)

English composition for speakers of English as a second language. Drills in selected problems in English structure. Frequent exercises in composition. 4 lectures/problem-solving. Satisfactory score on the English Placement Test (EPT) or equivalent needed to enroll. ENG 102 and 103 together are equivalent to ENG 104.

ENG 103 College Composition for Speakers of English as a Second Language (4)

English composition for speakers of English as a second language. Frequent writing stressing exposition and logic. Drills in selected problems in English structure. Some techniques of library research. 4 lectures/problem-solving. Prerequisite: ENG 102. ENG 102 and 103 together are equivalent to ENG 104.

ENG 104 Freshman English I (4)

Introduction to expository writing and critical reading. Frequent papers. 4 lectures/problem-solving. ENG 102 and 103 may be substituted. Students must receive a satisfactory score on the English Placement Test (EPT) or equivalent to enroll. All speakers of English as a second language who have not achieved the minimum EPT score for ENG 104 must take ENG 102 and 103 in place of ENG 104.

ENG 105 Freshman English II (4)

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

ENG 108 Writing about Literature (4)

An introduction to literary studies. Readings in fiction, drama, and poetry. Frequent short papers. Techniques of library research. 4 lectures/problem-solving. 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 lectures/problem-solving.

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. Emphasis on enduring and universal ideas, such as the search for knowledge, self-understanding, and values. For majors other than English. 4 lecture-presentations. Prerequisite: ENG 104 or equivalent.

ENG 202 Introduction to Poetry or Modern Drama (4)

Readings in either poetry or 20th-century drama from America and other countries, specific offerings to be determined by instructor. Emphasis on the search for knowledge, self-understanding, and values. For majors other than English. 4 lecture-presentations. 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 lecture-presentations. Prerequisite: ENG 104 or equivalent.

ENG 204 Modern Fiction for Speakers of English as a Second Language (4)

Readings chiefly in the 20th-century short story and novel, with emphasis on the search for knowledge, self-understanding, and values. For majors other than English. Equivalent to ENG 201. 4 lecture-presentations. 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 lecture-presentations. Prerequisite: ENG 104 or equivalent.

ENG 206 Introduction to Contemporary Literature (4)

Readings, primarily novels, of important contemporary writers. Emphasis on controversial moral, social, and cultural issues. 4 lecture-presentations. Prerequisite: ENG 104 or equivalent.

ENG 207 Survey of British Literature I (4)

British literature, as exemplifying the history of ideas, from its beginnings to the late 18th century, with emphasis on the major works. 4 lecture-presentations. Prerequisite: ENG 104 or equivalent.

ENG 208 Survey of British Literature II (4)

British literature, as exemplifying the history of ideas, from the late 18th century to the present, with emphasis on the major works. 4 lecture-presentations. Prerequisite: ENG 104 or equivalent.

ENG 211 Survey of American Literature I (4)

Philosophical, religious, and literary ideas in American writing from colonial times through the mid-19th century. 4 lecture-presentations. Prerequisite: ENG 104 or equivalent.

ENG 212 Survey of American Literature II (4)

Philosophical, religious, political, and literary ideas in American writing from the mid- to late-19th century to the present. 4 lecture-presentations. Prerequisite: ENG 104 or equivalent.

ENG 215 Latino Literature in America (4)

Study of works by, and about, Latinos in America, within a broad historical and cultural context. 4 lecture-presentations. 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 lecture-presentations. Prerequisite: ENG 104 or equivalent.

ENG 217 World Literature I (4)

Major themes in selected literary masterpieces from ancient cultures, western and nonwestern, up to the 11th century of the Common era, read within thematic and cultural contexts. 4 lecture-presentations. Prerequisite: ENG 104 or equivalent.

ENG 218 World Literature II (4)

Major themes in selected literary masterpieces from different cultures, both western and nonwestern, from the 11th century of the Common era to the present, read within thematic and cultural contexts. 4 lecture-presentations. 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-presentations. 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 folklore phenomena in life and literature from different cultures. 4 lecture-presentations. 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. 4 lecture-presentations. 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. 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 lectures/problem-solving. 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 lectures/problem-solving. Prerequisite: a 200-level literature course.

ENG 303 Advanced Expository Writing (4)

Current practices in such forms as the essay, commentary, magazine article. 4 lectures/problem-solving. Prerequisite: ENG 105 or 108 or equivalent.

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 lecture-presentations. Prerequisite: a 200-level literature course.

ENG 306 The Modern British Novel (4)

Developments and directions in the novel since 1880; novelists such as Butler, Hardy, Forster, Huxley, Woolf, Rhys, Greene, Lessing. 4 lecture-presentations. Prerequisite: a 200-level literature course.

ENG 307 The English Drama to 1890 (4)

Development of English drama from medieval mystery and morality plays to late nineteenth-century drama, with an emphasis on non-Shakespearean Renaissance plays. 4 lecture-presentations. Prerequisite: a 200-level literature course.

ENG 308 The Modern Drama (4)

Continental, British, and American dramatic trends from the rise of Naturalism. 4 lecture-presentations. 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 lecture-presentations. Prerequisite: a 200-level literature course.

ENG 313 Language and Human Behavior (4)

Semantics; the symbolic process of English. Relationship of words and phrases to their referents. Effects of this relationship upon human thought, interpretation, and behavior. 4 lectures/problem-solving. 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 lectures/problem-solving. Prerequisite: ENG 104 or equivalent.

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 lectures/problem-solving. Prerequisite: ENG 104 or equivalent.

ENG 322 Development of Modern English (4)

Principles of language change as an aid to understanding present-day pronunciation, spelling, word formation, grammar, and usage in English. Social and cultural influences on the language. 4 lectures/problem-solving. Prerequisite: ENG 104 or equivalent.

ENG 323 Language Acquisition (4)

Development of the first language from birth through adolescence. Adult and child acquisition of second and subsequent languages. Linguistic, biological, and social factors that facilitate and retard language learning. 4 lectures/problem-solving. Prerequisite: ENG 104 or equivalent.

ENG 324 Children's Literature (4)

Readings in myth and folklore and in children's classics from the 18th century to the present. 4 lecture-presentations. 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 lecture-presentations. Prerequisite: a 200-level literature course.

ENG 350 Literary Theory (4)

Analysis of the works of selected major critics, with emphasis on the moderns. Application of principles in original critical essays. 4 lecture-presentations. 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 *Troilus and Criseyde*. Cultural background. 4 seminars. 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 seminars. Prerequisite: a 200-level literature course.

ENG 403 Shakespeare (4)

Selected plays through *Hamlet*. 4 seminars. Prerequisite: a 200-level literature course.

ENG 404 Shakespeare (4)

Selected plays after *Hamlet*. 4 seminars. Prerequisite: a 200-level literature course.

ENG 420 Literature of the Holocaust (4)

Historical and religious backgrounds of the Holocaust. Essays, fiction, poetry, and drama by writers such as Wiesel, Kosinski, Levi, Ozick, Steiner, Arendt, Hochhuth. 4 seminars. Prerequisite: 200-level literature course or permission of instructor.

ENG 440 English Renaissance (4)

Poets, 1500–1660, such as Spenser, Sidney, Jonson, Donne. 4 seminars. Prerequisite: a 200-level literature course.

ENG 442 English Enlightenment (4)

Writers, 1660–1800, such as Dryden, Pope, Swift, Johnson. 4 seminars. Prerequisite: a 200-level literature course.

ENG 444 English Romanticism (4)

Writers such as Blake, Wordsworth, Coleridge, Byron, Shelley, Keats. 4 seminars. 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 seminars. Prerequisite: a 200-level literature course.

ENG 450 Twentieth-Century British Literature (4)

Writers such as Conrad, Joyce, Yeats, Eliot, Lawrence. 4 seminars. Prerequisite: a 200-level literature course.

ENG 452 American Renaissance (4)

Writers such as Hawthorne, Emerson, Thoreau, Melville, Whitman, Dickinson. 4 seminars. Prerequisite: a 200-level literature course.

ENG 454 American Realism (4)

Writers such as Twain, Crane, Norris, London, James. 4 seminars. Prerequisite: a 200-level literature course.

ENG 456 Twentieth-Century American Literature (4)

Writers such as Faulkner, Fitzgerald, Hemingway, O'Neill, Frost. 4 seminars. Prerequisite: a 200-level literature course.

ENG 458 The Novel in the Modern World (4)

The nineteenth- and twentieth-century novel outside the United States and the United Kingdom; writers such as Tolstoy, Dostoevsky, Zola, Flaubert, Kafka, Mann, Moravia, Natalia Ginzburg, Sarraute, Garcia Marquez, Grass, Kawabata, Achebe, Oyono, Fuentes, and Gordimer. 4 seminars. Prerequisite: a 200-level literature course.

ENG 460 Modern Critical Theory (4)

Intensive study of recent developments in literary criticism, such as post-structuralist, feminist, reader-response, Marxist, and psychoanalytic theory. 4 seminars. Prerequisite: ENG 350 or permission of instructor.

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

FL 101 Elementary French I (4)

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation and grammar within a cultural context. 4 lecture-recitations.

FL 102 Elementary French II (4)

Extension of fundamentals of pronunciation and grammar within a cultural context for the continuing student. 4 lecture-recitations. Prerequisite: FL 101 or equivalent.

FL 103 Elementary French III (4)

Advanced grammatical patterns and pronunciation within a cultural context for the continuing student. 4 lecture-recitations. Prerequisite: FL 102 or equivalent.

FL 201 Intermediate French (4)

Review of grammar. Additional elements of French structure. Readings. 4 lecture-recitations. Prerequisite: FL 103 or equivalent.

FL 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-recitations. Prerequisite: FL 103 or equivalent.

FL 203 Intermediate French Composition and Conversation (4)

French composition, both oral and written. Frequent original presentations. 4 lecture-recitations. Prerequisite: FL 103 or equivalent.

FL 205 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-recitations.

FL 307 French Civilization (4)

Survey of French culture and social customs to the 20th century. Conducted in French. 4 lecture-recitations. Prerequisite: FL 103 or equivalent.

FL 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-recitations. Prerequisite: FL 202 or equivalent.

German

FL 111 Elementary German I (4)

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation, and grammar, within a cultural context. 4 lecture-recitations.

FL 112 Elementary German II (4)

Extension of fundamentals of pronunciation and grammar within a cultural context for the continuing student. 4 lecture-recitations. Prerequisite: FL 111 or equivalent.

FL 113 Elementary German III (4)

Advanced grammatical patterns and pronunciation within a cultural context for the continuing student. 4 lecture-recitations. Prerequisite: FL 112 or equivalent.

FL 114 Conversational German for Beginners (4)

Essentials of the spoken language for the beginner. Emphasis on everyday vocabulary and useful idiomatic phrases within a cultural context. Course includes fundamentals of reading and writing German. 4 lecture-recitations.

FL 211 Intermediate German (4)

Review of grammar; conversation; readings in original German. 4 lecture-recitations. Prerequisite: FL 113 or equivalent.

FL 212 Intermediate German Reading (4)

Development of reading proficiency in German; analysis and discussion of texts; some translation. Recommended for prospective graduate students. 4 lecture-recitations. Prerequisite: FL 113 or equivalent.

FL 213 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-recitations. Prerequisite: FL 113 or equivalent.

FL 317 German Civilization (4)

Survey of German culture and social customs. Conducted in German. 4 lecture-recitations. Prerequisite: FL 211 or equivalent.

Greek

FL 121 Elementary Ancient Greek I (4)

Essentials of ancient Greek for the beginner. Fundamentals of pronunciation, inflection, and grammar. Introduction to Greek culture. 4 lecture-recitations.

FL 122 Elementary Ancient Greek II (4)

Further study of fundamentals of inflection and grammar. Continued study of Greek culture. 4 lecture-recitations. Prerequisite: FL 121 or equivalent.

FL 123 Elementary Ancient Greek III (4)

Advanced grammar and inflections. Continued study of Greek culture. 4 lecture-recitations. Prerequisite: FL 122 or equivalent.

Latin

FL 131 Elementary Latin I (4)

Essential vocabulary, grammar, and syntax of classical Latin for the beginner. Basic translation. Introduction to Roman culture. FL 131, 132 and 133 together are equivalent to two years of high school Latin. 4 lecture-recitations.

FL 132 Elementary Latin II (4)

Extension of fundamental vocabulary, grammar, and syntax for the continuing student. Intermediate-level translation. Continued study of Roman culture. FL 131, 132, and 133 together are equivalent to two years of high school Latin. 4 lecture-recitations. Prerequisite: FL 131 or equivalent.

FL 133 Elementary Latin III (4)

Advanced vocabulary, grammar, and syntax for the continuing student. Advanced-level translation. Continued study of Roman culture. FL 131, 132, and 133 together are equivalent to two years of high school Latin. 4 lecture-recitations. Prerequisite: FL 132 or equivalent.

Russian

FL 141 Elementary Russian I (4)

The essentials of the spoken and written language. Fundamentals of grammar. Introduction to Soviet culture. 4 lecture-recitations.

FL 142 Elementary Russian II (4)

Further study of the basic grammatical patterns of Russian. Reading basic texts. Discussions of Soviet culture. 4 lecture-recitations. Prerequisite: FL 141 or equivalent.

FL 143 Elementary Russian III (4)

Study of additional basic grammatical patterns of Russian. Reading advanced Russian texts. Further discussions of Soviet culture. 4 lecture-recitations. Prerequisite: FL 142 or equivalent.

Spanish

FL 151 Elementary Spanish I (4)

Essentials of the spoken and written language for the beginner. Fundamentals of pronunciation, intonation, and grammar, within a cultural context. 4 lecture-recitations.

FL 152 Elementary Spanish II (4)

Extension of fundamentals of pronunciation and grammar within a cultural context for the continuing student. 4 lecture-recitations. Prerequisite: FL 151 or equivalent.

FL 153 Elementary Spanish III (4)

Advanced grammatical patterns and pronunciation within a cultural context for the continuing student. 4 lecture-recitations. Prerequisite: FL 152 or equivalent.

FL 251 Intermediate Spanish (4)

Review of grammar. Additional elements of Spanish structure. Readings. 4 lecture-recitations. Prerequisite: FL 153 or equivalent.

FL 252 Intermediate Spanish Reading (4)

Development of reading proficiency in Spanish; analysis and discussion of texts; some translation. Recommended for prospective graduate students. 4 lecture-recitations. Prerequisite: FL 153 or equivalent.

FL 253 Intermediate Spanish Conversation (4)

Intensive practice in comprehension and production of oral Spanish within the framework of Hispanic cultures. Frequent oral presentations. 4 lecture-recitations. Prerequisite: FL 153 or equivalent.

FL 254 Intermediate Spanish Composition (4)

Concentration on practical writing within the framework of Hispanic cultures. 4 lecture-recitations. Prerequisite: a 200-level Spanish course or permission of instructor.

FL 255 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 lecture-recitations, optional fieldwork. Prerequisite: FL 251 or equivalent.

FL 351 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 lecture-recitations. Prerequisite: FL 251 or permission of instructor.

FL 352 Spanish Civilization (4)

Culture of Spain, including art, music, history, social customs, and world outlook. Conducted in Spanish. 4 lecture-recitations. Prerequisite: FL 251 or equivalent.

FL 353 Latin American Civilization (4)

Culture of Latin America; pre-Columbian civilizations, colonial and early national periods. Conducted in Spanish. 4 lecture-recitations. Prerequisite: FL 251 or equivalent.

FL 354 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 lecture-recitations. Prerequisite: FL 251 or equivalent.

FL 355 Spanish-American Literature (4)

Selected aspects of Spanish-American literature. 4 lecture-recitations. Prerequisite: FL 251 or equivalent or permission of instructor.

FL 356 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-recitations. Prerequisite: FL 251 or permission of instructor.

ETHNIC AND WOMEN'S STUDIES DEPARTMENT

Richard Santillan, *Chair*
John Hatfield Mario Suarez James H. Williams
Patricia Lin

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 gender roles in the United States. The program is designed as an educational forum in which students and faculty explore the parallels of ethnic and gender stratification. The program consists of minors in Afroamerican 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.

AFROAMERICAN STUDIES MINOR

Introduction to Ethnic Studies	EWS	140	(4)
Afroamerican Experience	EWS	201	(4)
The Ethnic Woman	EWS	390	(4)
Afroamerican 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)

AMERICAN INDIAN STUDIES MINOR

Introduction To Ethnic Studies	EWS	140	(4)
American Indian Experience	EWS	203	(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 AMERICAN STUDIES MINOR

Introduction to Ethnic Studies	EWS	140	(4)
Asian American Experience	EWS	204	(4)
The Ethnic Woman	EWS	390	(4)
Asian Pacific American 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	202	(4)
The Ethnic Woman	EWS	390	(4)
Chicano/Hispanic 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)

WOMEN'S STUDIES MINOR

Introduction to the Study of Women and Men in Society	EWS	145	(4)
U.S. Women in Contemporary Global Context	EWS	380	(4)
The Ethnic Woman	EWS	390	(4)
Racism and Sexism	EWS	420	(4)
Female and Ethnic-Development	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 The University (4)

Course helps students understand systems of governance and unique culture of the university. Students introduced to values associated with academic and scientific exploration. Emphasis on development of critical thinking and communication skills. 4 lecture-discussions.

EWS 140 Introduction to Ethnic Studies (4)

Survey of ethnic American experience; introduction to fundamental theories of race relations and social processes producing social and gender stratification. Introduction to concepts and terms such as racism, sexism, ethnocentricism, etc. The course includes a survey of the four major ethnic groups in America. 4 lecture-discussions.

EWS 145 Introduction to the Study of Women and Men in Society (4)

Introduction to fundamental principles explaining reasons for the widely different roles women and men play in societies throughout the world. Includes introduction to concepts and terms such as sexism, sex vs. gender, and female/male roles in society. 4 lecture-discussions.

EWS 200 Special Problems for Lower Division Students (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.

EWS 201 Afroamerican Experience (4)

Survey of problems, methods, theories, and materials about Afroamericans; emphasis on historical factors and forces constituting the experience in the United States. 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 American Experience (4)

Focus on historic and contemporary presence of persons of Asian descent in the U.S. Includes the study of the impact of legislation, public opinion, and American foreign policy in Asia on the lives of Asians in America. 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 299 Special Topics for Lower Division Students (4)

Group study of a selected topic, to be specified in advance. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor. Two 2-hour seminar/discussion.

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 304 Asian American Communities: Comparative Analysis (4)

An in-depth examination and comparative analysis of Asian-American communities. Emphasis on intensive writing and oral presentation exercises for better understanding of the problems and issues confronting Asian-American communities. Prerequisite: EWS 204 or permission of instructor. 4 lecture/problem-solving.

EWS 330 Ethnicity and Family Life (4)

Seminar in the unique social and cultural aspects of marriage and family styles from the perspective of American ethnic groups. Two 2-hour seminar/discussion. Prerequisite: EWS 140, SOC 321 or permission of the instructor. May be repeated for credit only when ethnic group differs.

EWS 345 Ethnics and Women in the American Work Force (4)

An exploration of the meaning of work and occupational choices in the U.S. particularly as work and work choices relate to economic mobility, social prestige and political power. Two 2-hour seminar-discussions. Prerequisite: EWS 140 or EWS 145 or permission of instructor.

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 380 U.S. Women in Contemporary Global Context (4)

Examination of how individual ethnic and national cultures, economics, religion, and public policies generate issues that are particularly important to women. Seminar format; may be repeated as issues and topics vary. Prerequisite: EWS 145 or permission of instructor. Two 2-hour seminar/discussions.

EWS 390 The Ethnic Woman (4)

Issues concerning women in four ethnic communities: Afroamerican, Asian Pacific American, American Indian, and Chicano/Hispanic. Examination of roles and status within community context. Class is team-taught, with particular attention paid to the intersection of ethnicity and gender in each community. 4 lecture-discussions. Prerequisite: EWS 140 or EWS 145 or permission of instructor.

EWS 400 Special Problems for Upper Division Students (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.

EWS 401 Afroamerican Contemporary Issues (4)

Impact of Afroamerican movement on cultural continuity and social/political issues at local, state and national levels. The course will analyze the effects of educational, economic and political institutions of Afro-American culture. Two 2-hour seminar/discussions. Prerequisite: EWS 140 or EWS 201 or permission of instructor.

EWS 402 Chicano/Hispanic Contemporary Issues (4)

The examination of effects of educational, economic and political institutions on Chicano/Hispanic culture in the U.S. Emphasis on legislation, employment, health and education, and public policy and its impact on Hispanics. Two 2-hour seminar/discussion. Prerequisite: EWS 140 or EWS 202 or permission of instructor.

EWS 403 American Indian Contemporary Issues (4)

Seminar in the contemporary issues confronted by American Indians; employment, education, problems of relocation, water land rights and Bureau of Indian Affairs. Two 2-hour seminar/discussion. Prerequisite: EWS 203, 140, or permission of instructor.

EWS 404 Asian Pacific American Contemporary Issues (4)

A critical analysis of contemporary issues confronted by Asian-Americans and Pacific Islanders in the U.S. Emphasis will be placed on immigration, employment, health, family and cultural issues. Two 2-hour seminar/discussion. Prerequisite: EWS 140 or EWS 204 or permission of instructor.

EWS 410 Ethnicity, Folklore and the Fine Arts (4)

Folklore, art, music of ethnic groups; their meaning and value. Images of ethnic identity, artistic expression in contemporary use. Two 2-hour seminar/discussions. Prerequisite: Junior standing or permission of instructor.

EWS 420 Racism and Sexism (4)

Emphasis on the parallel strategies such as ranking, boundary maintenance, work ghettoization, sexual stereotypes, etc. that societies use to create racial and gender inequalities. Prerequisite: EWS 140, EWS 145 or permission of instructur. 4 lecture-discussions.

EWS 430 Ethnic Thought and Values (4)

Exploration of religious and ethical systems of the four major ethnic groups in America. Comparative approach is used to identify similarities and differences in values and life choices among the four ethnic groups and mainstream American society. 4 lecture-discussions.

EWS 431 Ethnic Thought and Values (4)

Exploration of religious and ethical systems of the four major ethnic groups in America. Comparative approach is used to identify similarities and differences in values and life choices among the four ethnic groups and mainstream American society. 4 lecture-discussions.

EWS 440 Female and Ethnic Development (4)

Examination of traditional theories and their explanation for gender inequality. Focus on alternative critiques by contemporary feminist and ethnic scholars regarding female and roles and relationships. Two 2-hour seminar/discussions. Prerequisite: EWS 145 or permission of instructor.

EWS 475 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. Two-Four 1-hour seminars.

EWS 499 Special Topics for Upper 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: EWS 140 or EWS 145 or permission of instructor.

HISTORY

Stephen F. Englehart, *Chair*
Anthony L. Brundage
Donald S. Castro
Mahmood Ibrahim
James G. Kamusikiri
David L. Levering
Gloria R. Lothrop
Ralph E. Shaffer
David R. Smith
William A. Smith
Elise K. Wirtschafter
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. Students who intend to teach in the public middle or high schools (where the curriculum is departmentalized) may meet the subject matter requirement for the appropriate teaching credential (the Single Subject Credential) either through examination or academic programs which "waive" the examination. The Cal Poly history major qualifies as a waiver program for the History/Social Science Credential provided that students elect the course in California History as well as complete the other major requirements. In fact, the History major was designated a model program of preparation by the evaluating committee of the state Commission on Teacher Credentialing.

We do recommend that those students who intend to apply for the Single Subject History/Social Science Credential seek to achieve the broadest possible chronological and geographical coverage when they select courses from the U.S., European and Area Studies categories of the History major curriculum.

Students qualifying for Single Subject Credentials in other fields (i.e., English, Mathematics, etc.) may add an authorization to teach either U.S. or World History by completing the requirements which have been established for such additional authorizations.

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)
History and Historians	HST	390	(4)
Senior Project	HST	461	(2)
Senior Project	HST	462	(2)
Undergraduate Seminar	HST	463	(2)
† 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	(4)
Phys Geo	GEO	101	(4)
or Cul. Geog.	GEO	102	
or US & Canada	GEO	350	
* Intro Cul Anth	ANT	102	
or Prin Soc	SOC	201	(4)
* Prin of Econ	EC	201	(4)
Prin of Econ	EC	202	(4)
* Freshman English I	ENG	104	(4)
* Freshman English II	ENG	105	(4)
* Pub Speaking	COM	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)
Students desiring to pursue graduate study should take at least one foreign language. *Designates G.E. course			
Unrestricted electives			(40)
(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, 305, 309, 313, 314, 315, 331, 332, 333, 335, 336, 337, 361, 362, 365, 399.

Select 12 units of American history series with the approval of advisor from HST 341, 342, 343, 344, 345, 346, 347, 370, 371, 372, 373, 374, 375, 376, 401, 402, 403, 405, 406, 412, 413, 414.

Select 12 units of European history series with the approval of advisor from HST 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 351, 352, 355, 356, 359, 399, 421, 425.

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

** 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 335 (4)
History of Latin America ..... HST 336 (4)
Latin American Government and Politics ..... PLS 444 (4)

The student must select 8 units from the following:

The Anthropology of Modernization ... ANT 352 (4)
U.S.-Latin American Relations ..... PLS 454 (4)
History of Latin America ..... HST 337 (4)
History of Brazil ..... HST 361 (4)
History of Mexico ..... HST 362 (4)
Literature of Mexico ..... FL 351 (4)
Spanish-American Literature ..... FL 355 (4)
Music of Mexico ..... MU 311 (4)

Students in the minor are encouraged to have language competency in Spanish and if possible Portuguese. For further information on Minor see Dr. Donald S. Castro, Latin American Studies Coordinator. (Bld 1-Rm 221).

Course Descriptions

All upper-division courses may be taken on a CR/NC basis except for HST 300, 400, 461, 462, and 463.

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. 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)

Writing the history research paper; introduction to research and writing techniques through completion of a project under faculty supervision. 4 seminar-discussions. Prerequisite: Eng 104 and 105 or permission of instructor.

HST 301 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 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 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 305 India and 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 309 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 post-war spread of nationalism and Communism. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 313 Middle East: Rise of Islam (4)

Muhammad and the origins of the Islamic faith. Foundations of the Arab empire in the Middle East and North Africa. Analysis of the Islamic faith and civilization. The Omayyad and Abbasid Caliphates. The waning of Arab hegemony. 4 lecture-discussions. Prerequisite: junior standing or permission of the instructor.

HST 314 Middle East: Ottoman Empire (4)

Decline of Arab power. Rise of Seljuk and Ottoman Turks. Mongol invasions. Fall of the Byzantine Empire. The Ottoman hegemony; challenge of Sefavid Persia. Incursion of Western powers in the 19th century. World War I and collapse of Ottoman Empire. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 315 Middle East: The 20th Century (4)

The Middle East since the collapse of the Ottoman Empire. Western Imperialism. Rise of Arab nationalism and state building. Zionism and Israel. Turkey and Iran. Economic, political, social, and cultural problems of the region. Revival of militant Islam and anti-westernism. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 317 Ancient 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 318 Hellenistic Greece and Republican Rome (4)

Comparative cultural aspects of Hellenistic Greece and Republican Rome. Impact of Alexander's conquest on Greek Society; Hellenistic scientific, technical and cultural achievements and their influence on Rome. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 319 Imperial Rome (4)

Political, social and cultural aspects of the Roman Empire. Formation of the empire; provincial governance and economies; rise of bureaucracy and army; Christian beginnings; intellectual and social developments. 4 lecture-discussions. Prerequisite: Junior standing or permission of instructor.

HST 320 Early Middle Ages 300–1100 (4)

Cultural, social, intellectual, political, and economic history of Western Europe from A.D. 300 to 1100. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 321 High and Late Middle Ages 1100–1450 (4)

Cultural, social, intellectual, political, and economic history of Western Europe from 1100 to 1500. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 322 Renaissance, Reformation, and Wars of Religion: 1450–1648 (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 Enlightenment, Absolutism, and Constitutionalism: 1648–1789 (4)

Europe from Treaty of Westphalia to French Revolution: struggle over absolute and constitutional forms of monarchy; origins of liberalism; Atlantic powers' struggle for empire; the Enlightenment; social and economic changes on eve of Industrial Revolution; origins of French Revolution. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 324 Revolution and Reaction: 1789–1850 (4)

Origins, development, and impact of French Revolution and Napoleon on Europe. Revolutions of 1830 and 1848. Impact of early industrialization and revolutionary aspirations on social structure, political systems, and cultural values, including formation of modern ideologies like Marxism. 4 lecture-discussions. Prerequisite:

HST 325 Nationalism, Imperialism, and Industrialization: 1850–1914 (4)

Europe's world hegemony. Impact of rapid industrialization on social structure, political systems, and cultural values. Impact of unification of Italy and Germany on international system; origins of World War I. Origin of modernism in the arts. Critique of liberalism. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 326 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 331 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 era. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 332 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 333 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 335 Latin America: The Colonial Period (4)

Latin America from its pre-Columbian origins to the era of the Wars of Independence. Emphasis on the social and cultural factors which characterized the colonial period. 4 lecture-discussions.

HST 336 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. 4 lecture-discussions.

HST 337 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 341 Anglo-American Colonial History (4)

Political, social, economic, ecological study of the English and Colonial worlds. Qualities of colonial life as contributory to revolt. Colonial cultural debt to the Old World. 4 one-hour seminars. Prerequisite: AMC 201 or PLS 201 and AMC 202 or HST 202.

HST 342 America in the Federal Period (4)

Analysis of origins and content of American revolutionary ideology that formed the Declaration of Independence and Constitution; seminar examination of primary source materials and competing interpretations. 4 seminar-discussions. Prerequisite: Category VI.

HST 343 The Age of Jackson (4)

Extended analysis of the transformation of America from a revolutionary, republican, homogenous society to an expansionist, democratic and diverse society; student examination of primary source materials and competing interpretations. 4 one-hour seminars. Prerequisite: AMC 201 or PLS 201 and AMC 202 or HST 202.

HST 344 Civil War and Reconstruction (4)

Analysis of origins of the crisis of 1860–65 and resulting institutional changes, especially the redefinition of the positions of Black people; student report on primary source materials and competing interpretations. 4-hour seminar. Prerequisite: AMC 201 or PLS 201 and AMC 202 or HST 202.

HST 345 The Gilded Age and the Progressive Era 1865–1914 (4)

Analysis of historical events in the United States during the last decades of the nineteenth century to the beginning of World War I; requires research in primary sources and historiographical interpretation. 4 one-hour seminars. Prerequisite: AMC 201 or PLS 201 and AMC 202 or HST 202.

HST 346 War and Depression: The United States 1914–1945 (4)

Student examination and analysis of selected problems in America from the origins of World War I to the conclusion of World War II: emphasis on interpretation of American life as reflected in newspapers, magazines, books, films and recordings from that era. 4 one-hour seminars. Prerequisite: AMC 201 or PLS 201 and AMC 202 or HST 202.

HST 347 United States since 1945 (4)

Analysis of critical issues affecting foreign policy, political economy, society and culture since the end of World War II. Emphasis on primary source materials focusing on the themes of conformity and continuity. 4 one-hour seminars. Prerequisite: AMC 201 or PLS 201 and AMC 202 or HST 202.

HST 351 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 352 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 355 Russia 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 356 The Soviet Union (4)

Bolshevik Revolution, Soviet constitution, development of political institutions, major economic and diplomatic developments since 1917. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 359 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 361 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 362 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 365 China Since 1949 (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 370 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 371 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 372 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 373 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 374 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 375 The American Southwest (4)

The history of the Southwest from 1848, 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 376 The American 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 390 History and Historians (4)

Critical and analytical examination of traditional and contemporary approaches to historiography. Short essays and a research paper on a single historian, a particular methodology, or a school of historical interpretation required. 4 seminar-discussions. Prerequisite: HST 300 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 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 401 Blacks in America I (4)

The historical experience and contributions of Black Americans from the diaspora through World War I, focusing on the impact and significance of slavery, the Civil War and Reconstruction, the Industrial Revolution, urbanization and World War I. 4 lecture-discussions. Prerequisite: junior standing or permission of instructor.

HST 402 Blacks in America II (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 403 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 405 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 406 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 411 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 History of Collective Bargaining (4)

History and practice of collective bargaining and of the American labor movement. Contemporary trends in the labor movement and in the use of collective bargaining principles for community organization and problem solving. 4 one-hour seminars. Prerequisite: AMC 201 or PLS 201 and AMC 202 or HST 202.

HST 413 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 414 Diplomatic History of the United States (4)

Seminar investigating controversial historical problems in U.S. foreign relations; motivations for policy-decisions; Revolutionary diplomacy; Monroe Doctrine; 19th century imperialism; the World Wars; U.S. and Latin America, East Asia, Europe, the Middle East, Soviet Union. 4 seminar-discussions. Prerequisite: Category VI.

HST 421 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 425 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 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: HST 300.

HST 463 Undergraduate Seminar (2)

Study and discussion by students of recent developments in the students' History major field of focus.

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

Victor N. Okada, *Chair,* English and Foreign Languages

The major in Humanities explores humanistic culture, its origins, values, and changing status. It seeks to define humanistic activity within its varied and traditional settings: not only in the visual, musical, literary, and other arts, but also in their theoretical foundations in political, religious, philosophical, and other thought.

Like the humanities themselves, the curriculum is necessarily cross-disciplinary, multi-dimensional, open-ended. It fosters critical inquiry into the problematical situation of humanistic enterprise itself in a contemporary world in which technology, multiculturalism, social and political conflict, and other urgent realities all enter competing claims. At the same time, the major in Humanities prepares students to reflect resourcefully on the nature and values of their own humanist assumptions.

The curriculum combines breadth with depth. In the core, survey courses in world literature and the study of the humanities provide preparation for relatively more intensive study within a single 24-unit emphasis. Allowing broad choices among courses in a variety of related disciplines—including American Studies, Art, Drama, English and Foreign Languages, Ethnic and Women's Studies, History, Music, Philosophy, and Sociology—each of these emphases lists courses (specified below) relative to a given major focus. Emphases from which to choose are as follows: the North American Experience; European; Black/African-American; Hispanic/American; Asian/American; Women; Forms of Order, Organization, and Action in the Contemporary World.

Focus is further provided by 16 units of study in foreign language or literature, by a 76-unit Integrated General Education sequence, and by 12 units of culminating writing and coursework, including Senior Paper (ENG 461, 462). Choice of a minor, if the student elects, is facilitated by 38 units of unrestricted electives.

The Humanities major is designed for those students whose main goal as undergraduates is the acquisition of liberal education as well as for those preparing for a career in law, business, or other fields or for graduate or professional school.

CORE COURSES FOR MAJOR *

(Required of all students)

Introduction to the Humanities	HUM	201	(4)
World Literature I	ENG	217	(4)
World Literature II	ENG	218	(4)
Choice of 4 foreign-languages courses	FL'		(16)
Advanced Expository Writing	ENG	303	(4)
The Novel in the Modern World	ENG	458	(4)

Choice of 6 courses, not more than 2 within a single department, within any ONE of the following Emphasis areas (full listings given at end of curriculum): (1) The North American Experience (including American Indian); (2) The European Experience (including Classical and England); (3) The Black/African-American Experience; (4) The Hispanic/American Experience; (5) The Asian/American Experience; (6) The Experience of Women; (7) Forms of Order, Organization, and Action in the Contemporary World (24)

Senior Paper	ENG	461	(2)
Senior Paper	ENG	462	(2)

Two approved upper-division Special Topics courses, seminars, or Cooperative Education projects (8)

General Education Courses

(Required of all students)

Consciousness and Community	IGE	120	(4)
Rationalism and Revelation	IGE	121	(4)
Authority and Faith	IGE	122	(4)
Culture and Contact	IGE	220	(4)
Reform and Revolution	IGE	221	(4)
Individualism and Collectivism	IGE	222	(4)
Promise and Crisis	IGE	223	(4)
Connections Seminar	IGE	224	(4)

Category I: 2 courses (except ENG 104) from either pattern (8)

Category II: any pattern (16)

Category III: any course from any group (4)

Category IV: any course from group A (4)

Category V: requirement satisfied by IGE sequence -

Category VI: requirement satisfied by IGE sequence

Category VII: any package from the non-designated list. (12)

4 units in Category VII may be used to satisfy 4 lower-division units in Categories II, III, IV.

UNRESTRICTED ELECTIVES (38)**

Emphases: 24 units in the core curriculum (above) are to be taken in any ONE of the following 7 Emphases. Not more than 2 courses may be taken in the same department. Courses, especially FL, may require prerequisites. Students are responsible for meeting all prerequisites.

Emphasis: The North American Experience (Including American Indian Experience)

Varieties of American Culture	AMS	333
American Ideologies	AMS	345
Women in American Society	AMS	350
American Dreams, Myths, and Realities	AMS	450
Indians of California	ANT	320
Indians of North America	ANT	321
History of Art of the United States	ART	310
Introduction to American Theatre	DR	210
Economic History of the U.S.	EC	409
American Renaissance	ENG	452
American Realism	ENG	454
Twentieth Century American Literature	ENG	456
American Indian Experience	EWS	203
American Indian Contemporary Issues	EWS	403
Ethnic Thought and Values I	EWS	430
Ethnic Thought and Values II	EWS	431
U.S. and Canada Geography	GEO	350

Not more than 2 History courses, 200 level and above, concerned with the history of North America and the United States

Introduction to Jazz Styles ..... MU 110
Role of Sport in Contemporary Society ..... PE 450
American Indian Thought and Religion ..... PHL 307
American Philosophy ..... PHL 320
American State and Local Politics ..... PLS 328
American Political Thought ..... PLS 433
Contemporary Social Problems ..... SOC 301
Contemporary American Scene ..... SSC 401

Emphasis: The European Experience (Including Classical and England)

Foundations of Modern Art ..... ART 312
Art of the 20th Century ..... ART 313
Art of Ancient Civilizations ..... ART 315
Art of the Classical World ..... ART 316
Art of the Middle Ages ..... ART 317
Art of the Italian Renaissance ..... ART 318
History of the Theatre ..... DR 311
History of the Theatre ..... DR 312
History of the Theatre ..... DR 313
Economic History of Europe ..... EC 413

Not more than 2 upper-division ENG courses concerned with the literature of England or continental Europe (other than ENG 458)

French Civilization ..... FL 307
Contemporary France ..... FL 308
German Civilization ..... FL 317
Europe: Land and People ..... GEO 359

Not more than 2 upper-division History courses concerned with the history of Europe (including eastern Europe and Russia)

History of Music to 1750 ..... MU 404
History of Music 1750 to 1900 ..... MU 405
History of Twentieth Century Music ..... MU 406

Not more than 2 Philosophy courses from the following: PHL 203, 211, 306, 312, 313, 314, 315, 318, 319, 410, 415, 469

Introduction to Political Thought ..... PLS 204
Ancient and Medieval Political Thought ..... PLS 431
Modern Political Thought ..... PLS 432
Marxism ..... PLS 435
European Governments and Politics ..... PLS 441

Emphasis: The Black/African-American Experience

History of Tribal Arts ..... ART 211
Economics of Underrepresented Groups ..... EC 497
Black Literature in America ..... ENG 205
Afroamerican Experience ..... EWS 201
The Ethnic Woman ..... EWS 390
Afroamerican Contemporary Issues ..... EWS 401
Racism and Sexism ..... EWS 420
Ethnic Thought and Values I ..... EWS 430
Geography of Africa ..... GEO 358
Pre-Colonial Africa ..... HST 331
Colonial Africa ..... HST 332
Civil War and Reconstruction ..... HST 344
The American South ..... HST 376
Blacks in America I ..... HST 401
Blacks in America II ..... HST 402
Introduction to Jazz Styles ..... MU 110
American Ethnic Politics ..... PLS 323
Sub-Saharan African Governments and Politics ..... PLS 442
Ethnic Relations in America ..... SOC 320
Sociology of Minority Communities ..... SOC 323

Emphasis: The Hispanic/American Experience

Art of Mexico, Central and South America ..... ART 314
Economics of Underrepresented Groups ..... EC 497
Latino Literature in America ..... ENG 215
Chicano/Hispanic Experience ..... EWS 202
The Ethnic Woman ..... EWS 390
Chicano/Hispanic Contemporary Issues ..... EWS 402
Racism and Sexism ..... EWS 420
Ethnic Thought and Values II ..... EWS 431
Hispanic and American Indian Folklore of the Southwest ..... FL 255
Literature of Mexico ..... FL 351
Latin American Civilization ..... FL 353
Contemporary Latin American Civilization ..... FL 354
Geography of Latin America ..... GEO 352
Latin America: The Colonial Period ..... HST 335
Latin America: The Era of National Building ..... HST 336
Latin America: Problems of the 20th Century ..... HST 337
Brazil ..... HST 361
Mexico ..... HST 362
California ..... HST 370
Regional History of Southern California ..... HST 371
Local History of Southern California ..... HST 372
Social History of Southern California ..... HST 373
The American Southwest ..... HST 375
Music of Mexico ..... MU 311
American Ethnic Politics ..... PLS 323
Latin American Governments and Politics ..... PLS 444
Ethnic Relations in America ..... SOC 320
Sociology of Minority Communities ..... SOC 323

Emphasis: The Asian/American Experience

History of Asian Art ..... ART 216
Economics of Underrepresented Groups ..... EC 497
Asian Pacific American Experience ..... EWS 204
The Ethnic Woman ..... EWS 390
Asian/Pacific American Contemporary Issues ..... EWS 404
Racism and Sexism ..... EWS 420
Ethnic Thought and Values I ..... EWS 430
Geography of Asia ..... GEO 357
East Asia to 1800 ..... HST 301
East Asia in the 19th Century ..... HST 302
East Asia in the 20th Century ..... HST 303
Southeast Asia ..... HST 305

India and South Asia ..... HST 309
Middle East: Rise of Islam ..... HST 313
Middle East: Ottoman Empire ..... HST 314
Middle East: 20th Century ..... HST 315
China since 1949 ..... HST 365
Euro-Asian Immigrants in American Life ..... HST 405
World Religions: Oriental ..... PHL 210
Philosophy and Religion of Japan ..... PHL 401
Philosophy and Religion of China ..... PHL 402
Philosophy and Religion of India ..... PHL 403
American Ethnic Politics ..... PLS 323
Chinese Government and Politics ..... PLS 443
Asian Governments and Politics ..... PLS 445
Ethnic Relations in America ..... SOC 320
Sociology of Minority Communities ..... SOC 323
Asian-American Experience in the United States ..... SSC 301

Emphasis: The Experience of Women

Women in American Society ..... AMS 350
Woman: An Anthropological View ..... ANT 405
Women and Men: Changing Sex Roles ..... BHS 328
Women Writers ..... ENG 240
Introduction to the Study of Women ..... EWS 145
Women in Contemporary Society ..... EWS 380
The Ethnic Woman ..... EWS 390
Racism and Sexism ..... EWS 420
Female and Ethnic Development ..... EWS 440
Women in the United States ..... HST 406
History of Women in Sport ..... PE 469

Emphasis: Forms of Order, Organization, and Action in the Contemporary World

Varieties of American Culture ..... AMS 333
Environment, Technology and Culture ..... ANT 350
The Anthropology of Modernization ..... ANT 352
Cultural Areas of the World ..... ANT 399
Art of the 20th Century ..... ART 313
Intercultural Communication ..... COM 327
Human Communication Theory ..... COM 328
Communications Ethics ..... COM 401
Public Opinion, Propaganda, and the Mass Media ..... COM 413
Seminar in Land Economics ..... EC 419
Seminar in Urban Economics ..... EC 432
Seminar in Environmental Economics ..... EC 435
Business and Government ..... EC 440
Economic Geography ..... GEO 312
Political Geography ..... GEO 313
Urban Geography ..... GEO 315
United States since 1945 ..... HST 347
History of Modern Nation States ..... HST 399
The City in American Life ..... HST 411
The Scientific Revolution ..... HST 421
Great Britain and the Industrial Revolution ..... HST 425
History of American Business ..... HST 510
Modern Religious Trends ..... PHL 306
Contemporary Ethical Problems ..... PHL 309
Philosophy of Freedom and Order ..... PHL 410
Philosophy of Justice ..... PHL 415
Medical Ethics ..... PHL 433
Social Philosophy ..... PHL 480
Public Administration ..... PLS 314
Public Policy Administration ..... PLS 315
Bureaucracy and Administrative Behavior ..... PLS 316
Political Development ..... PLS 342
Marxism ..... PLS 435
Twentiety-Century Political Thought ..... PLS 436
Psychology of Politics ..... PLS 438
International Relations ..... PLS 452
Social Psychology ..... PSY 401
Principles of Behavioral Management ..... PSY 450
Contemporary Social Problems ..... SOC 301
Social Organization ..... SOC 310
Family as a Social Institution ..... SOC 321
Collective Behavior and Social Movements ..... SOC 350
Urban Sociology ..... SOC 401
Contemporary American Scene ..... SSC 401

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

** The total curriculum must include 60 units of upper-division courses. A minimum of 30 units of unrestricted elective credit must represent work in upper-division courses.

HUM 201 Introduction to the Humanities (4)

Introduction to concepts and practices of the humanities, with emphasis on the condition of the humanities and humanist ideals in the modern era. Overview of traditional humanism. Selected philosophical, artistic, and literary texts. 4 lecture-presentations. Prerequisite: ENG 104 or equivalent.

LIBERAL STUDIES

Sheila Manes McCoy, *Chair*

The major in Liberal Studies offers a diversified curriculum for those who are attracted to an interdisciplinary 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 provide the undergraduate preparation for students to teach in the public schools of California. Liberal Studies is approved by the Commission on Teacher Credentialing as a baccalaureate waiver program for entry into a multiple subject credential program. 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 concentration in an area of one's choice. The second is the recommended baccalaureate curriculum preparation for the teaching credential program (mono-lingual). The third is the baccalaureate curriculum preparation for teaching with a bi-lingual, cross-cultural Chicano focus.

Admission to the School of Education Program is by separate application, usually in the senior year. Students choosing a career in education should consult with the School of Education for entrance requirements for the credential program. Students are also advised that the California Basic Education Skills Test (CBEST) should be taken in their junior year to appropriately address possible deficiencies prior to graduation or application to the School of Education. Students taking the Bi-lingual/Cross-cultural option should consult with the department chair to ensure that they have the proper coursework and experience to meet the credentialing requirements in this area.

The curriculum includes ten discipline areas: language studies, literature, mathematics, science, social science, history, humanities, the arts, physical education, and human development. 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 or a diversified series of courses tailored to the student's own interests, and the professional program in teacher training but only if the student has been admitted to the School of Education.

All students are assigned an advisor according to the first initial of their last name. Please see department for the list of advisors.

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.

CORE COURSES FOR MAJOR *

(Required of all students)

Advanced Expository Writing	ENG	303	(4)
or Writing for the Professions	ENG	301	
Art Skills Elective	ART		(3)
or Design/Built Environ	ES	112	
Intro to Liberal Studies	LS	201	(4)
Liberal Studies Seminar	LS	401	(4)

OPTION COURSES FOR MAJOR *

(Required in specific options)

Liberal Studies

The Visual Arts	ART	110	(4)
or Intro to the Theatre	DR	203	
or Music Appreciation	MU	101	
English Language and Lit U.D.	ENG		(12)
Foreign Language			(12)
History of Civilization	HST	101	(4)
History of Civilization	HST	102	(4)
History of Civilization	HST	103	(4)
Elective in Math or Science (U.D.)			(4)
Elective in Math/Science (L.D.)			(4)
Electives in Social Science			(8)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Liberal Studies—Pre-Credential

Language Acquisition	ENG	323	(4)
Concepts of Elementary Math	MAT	207	(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)
Basic Concepts Geom II	MAT	491	(4)
Sociology of Minority Comm.	SOC	323	(4)
or Contem. American Scene	SSC	401	
or Ethnic Cultures in the U.S.	EWS	360	
or Soc. Anthropology	ANT	358	

Bi-lingual/Cross-cultural, Chicano—Pre-Credential

Language Acquisition	ENG	323	(4)
Concepts of Elementary Math	MAT	207	(4)
Spanish Language or Civilization	FL		(8)
Creative Drama	DR	471	(4)
Art of Mexico, Cen. Amer., & S. Amer.	ART	314	(4)
or World of Music	MU	103	
or Music of Mexico	MU	311	
Developmental Movement	PE	328	(3)
Chicano/Hispanic Experience	EWS	202	(4)
History of Mexico	HST	362	(4)
or History of Latin America	HST	336	
or History of Latin America	HST	337	

American Ethnic Politics ..... PLS 323 (4)
or Cult. Areas of World (Meso Amer.) ..... ANT 399
Basic Concepts Geom II ..... MAT 491 (4)

SUPPORT AND ELECTIVE COURSES

(Required only in pre-credential options)

Cultural Geography ..... GEO 102 (4)
Intro. to Schooling ..... EDU 301 (4)
Child Psychology: Middle Years ..... PSY 311 (4)
Music Lit.-for Children ..... MU 401 (4)
Children's Lit. ..... ENG 342 (4)
Art and the Child ..... ART 405 (4)

(Required in all options)

Select one from approved concentrations. .....(20)

See Department for list.

GENERAL EDUCATION

(Required in specific options)

Liberal Studies

Category I

Pattern 1 .....(12)
A. Freshman English I ..... ENG 104
B. Public Speaking ..... COM 100
C. Logic & Semantics ..... PHL 202
or Pattern 2 .....(12)
A. Freshman English I ..... ENG 104
B. Advocacy & Argum. ..... COM 204
C. Freshman English II ..... ENG 105

Category II

Math and Science courses to satisfy Category II, Pattern 2. Must include at least one lab class. .....(16)

Category III

Arts Elective .....(4)
Introduction to Philosophy ..... PHL 201 (4)
or World Religions ..... PHL 210
or World Religions ..... PHL 211
English 201 or 202, 203, 204, 205, 206 207, 208, 211, 212, 217, 218 .....(4)

Category IV

Principles of Economics ..... EC 202 (4)
or Principles of Economics ..... EC 201
Cultural Anthropology ..... ANT 102 (4)
or Principles of Sociology ..... SOC 201
See Advisor .....(4)

Category V

General Psychology ..... PSY 201 (4)

Category VI

American Civilization ..... AMC 201 (4)
or Intro to Amer. Gov't ..... PLS 201
American Civilization ..... AMC 202 (4)
or U.S. History ..... HST 202

Category VII

See Advisor .....(8)

Liberal Studies—Pre-Credential

Category I

Freshman English I ..... ENG 104 (4)
Advocacy & Argument ..... COM 204 (4)
Freshman English II ..... ENG 105 (4)

Category II

Concepts of Elem Math ..... MAT 205 (4)
Concepts of Elem Math ..... MAT 206 (4)
Physics Concepts and Activities ..... SCI 210 (4)
Chemical Sciences ..... SCI 211 (4)
Geological Sciences ..... SCI 212 (4)
Life Science ..... BIO 110 (3)

Category III

The Visual Arts ..... ART 110 (4)
or Intro. to Theatre ..... DR 203
or Music Apprec. ..... MU 101
Introduction to Philosophy ..... PHL 201 (4)
or World Religions ..... PHL 210
or World Religions ..... PHL 211
English 201 or 202, 203, 204, 205, 206, 207, 208, 211, 212, 217, or 218 ..... (4)

Category IV

Principles of Economics ..... EC 202 (4)
or Principles of Economics ..... EC 201
Cultural Anthropology ..... ANT 102 (4)
or Principles of Sociology ..... SOC 201
California ..... HST 370 (4)

Category V

General Psychology ..... PSY 201 (4)

Category VI

American Civilization ..... AMC 201 (4)
or Intro to American Gov't ..... PLS 201
American Civilization ..... AMC 202 (4)
or U.S. History ..... HST 202

Category VII

Select two:

Geography of California ..... GEO 351 (4)
Amer. State & Local Politics ..... PLS 328 (4)
Indians of California ..... ANT 320 (4)

Bi-lingual/Cross-cultural, Chicano—Pre-Credential

Category I

Freshman English I ..... ENG 104 (4)
Advocacy & Argument ..... COM 204 (4)
Freshman English II ..... ENG 105 (4)

Category II

Concepts of Elem Math ..... MAT 205 (4)
Concepts of Elem Math ..... MAT 206 (4)
Physics Concepts and Activities ..... SCI 210 (4)
Chemical Sciences ..... SCI 211 (4)
Geological Sciences ..... SCI 212 (4)
Life Science ..... BIO 110 (3)

Category III

The Visual Arts ..... ART 110 (4)
or Intro. to Theatre ..... DR 203
or Music Apprec. ..... MU 101

Introduction to Philosophy	PHL	201	(4)
or World Religions	PHL	210	
or World Religions	PHL	211	
Spanish Language or Civ	FL		(4)
Category IV			
Principles of Economics	EC	202	(4)
or Principles of Economics	EC	201	
Cultural Anthropology	ANT	102	(4)
or Principles of Sociology	SOC	201	
California	HST	370	(4)
Category V			
General Psychology	PSY	201	(4)
Category VI			
American Civilization	AMC	201	(4)
or Intro to American Gov't	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Category VII			
Select two:			
Geography of Calif	GEO	351	(4)
Amer. State & Local Politics	PLS	328	(4)
Indians of California	ANT	320	(4)

Course Descriptions

Note: Courses offered in Liberal Studies may be taken Credit/No Credit (CR/NC).

LS 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation of selected problems. Total credits limited to 4 units, with a maximum of 2 units per quarter.

LS 201 Introduction to Liberal Studies (4)

Introduction to the key concepts and approaches which unite the Humanities and Social Sciences and introduction to the organizing concepts in Mathematics and the Sciences. 4 lecture-discussion.

LS 400 Special Problems for Upper Division Students (4)

Individual or group investigation of selected problems. Total credits limited to 4 units, with a maximum of 2 units per quarter.

LS 401 Liberal Studies Seminar (4)

Analyses of enduring themes and issues in the Humanities and Social Sciences. Frequent written and oral presentations. Prerequisites: ENG 104 and ENG 105 or equivalent, upper division standing and LS 201. 4 hours seminar.

MUSIC

William G. Carter, *Chair*
Donald Ambroson
Philip R. Browne
Susan M. Burns
Phillip C. Clarke
Stanley Gibb
David M. Grasmick
Charles E. Lindsley
Althea Waites

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, Composition, Voice, Single Subject Waiver in Instrumental Music, or Single Subject Waiver in Vocal Music.

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 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	101	(4)
World of Music	MU	103	(4)
Concert Attendance	MU	105	(12)
Class Piano	MU	111	(1)
Class Piano	MU	112	(1)
Class Piano	MU	113	(1)
Studio Instruction	MU	170	series (6)
Structure of Music: Beginning Harmony	MU	201	(3)
Structure of Music: Intermediate Harmony	MU	202	(3)
Structure of Music: Advanced Harmony	MU	203	(3)
Beginning Conducting	MU	207	(2)
Class Piano	MU	211	(1)
Class Piano	MU	212	(1)
Class Piano	MU	213	(1)
Musicianship	MU	221	(1)
Musicianship	MU	222	(1)
Musicianship	MU	223	(1)
Structure of Music: Modal Counterpoint	MU	301	(3)
Structure of Music: Tonal Counterpoint	MU	302	(3)
Structure of Music: Form and Analysis	MU	303	(3)
Instrumental Conducting	MU	307	(2)
or			
Choral Conducting	MU	308	(2)
Musicianship	MU	321	(1)
Musicianship	MU	322	(1)
Musicianship	MU	323	(1)
History of Music to 1750	MU	404	(4)
History of Music 1750–1900	MU	405	(4)
History of Twentieth Century Music	MU	406	(4)
Senior Recital	MU	462	(2)

SPECIALIZATION AREAS

Additional courses in choice of one of five specialization areas (Composition, Instrumental, Voice, Single Subject Waiver in Instrumental Music, or Single Subject Waiver in Voice) ..... (32 to 40)

Courses to complete General Education Requirements ..... (72)*
Unrestricted electives ..... (8–15)

COMPOSITION

Intro to Electronic Music	MU	108	(3)
Studio Instruction (Composition)	MU	178	(3)
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 I	MU	237	(1)
Orchestration	MU	306	(3)
Instrumental Conducting	MU	307	(2)
Choral Conducting	MU	308	(2)
Arranging	MU	309	(3)
Studio Instruction (Composition)	MU	378	(3)
Computers and Music	MU	408	(2)
The student must select 4 units from upper division performance ensembles			(4)

INSTRUMENTAL

Recording Techniques	MU	208	(2)
String Fundamentals	MU	231	(1)
Brass Fundamentals	MU	232	(1)
Woodwind Ensembles	MU	233	(1)
Percussion Fundamentals	MU	234	(1)
Voice Fundamentals I	MU	237	(1)
Orchestration	MU	306	(3)
Studio Instruction	MU	370	(6)
The student must select 6 units from:			(6)
Concert Band	MU	152	(1)
Symphonic Wind Ensemble	MU	153	(1)
Concert Choir	MU	161	(1)
The student must select 6 units from small ensembles in the MU 340 series			(6)
The student must select units from:			(6)
Concert Band	MU	352	(1)
Symphonic Wind Ensemble	MU	353	(1)
Concert Choir	MU	361	(1)
The student must select 5 units from upper division music classes			(5)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

VOICE

Introduction to Acting	DR	125		(4)
The student must select 1 unit from the following:				(1)
String Fundamentals	MU	231		(1)
Brass Fundamentals	MU	232		(1)
Woodwind Fundamentals	MU	233		(1)
Percussion Fundamentals	MU	234		(1)
Voice Fundamentals I	MU	237		(1)
The student must select 12 units from the following:				(12)
Concert Choir	MU	161/361	(1)	(1)
Chamber Singers	MU	164/364	(1)	(1)
Opera Workshop	MU	166/366	(1)	(1)
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 music major with a VOCAL emphasis must include 8 units of G.E. courses selected from: FL 101, 102 or FL 111, 112				

SINGLE SUBJECT WAIVER IN INSTRUMENTAL MUSIC

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 I	MU	237		(1)
Marching Band Techniques	MU	251		(1)
Orchestration	MU	306		(3)
Arranging	MU	309		(3)
Instrumental Techniques for Secondary Education	MU	357		(2)
Vocal Techniques for Secondary Education	MU	367		(2)
Studio Instruction	MU	370		(4)
The student must select 12 units from the following:				(12)
Marching Band	MU	151/351	(1)	(1)
Concert Band	MU	152/352	(1)	(1)
Symphonic Wind Ensemble	MU	153/353	(1)	(1)
Jazz Band	MU	154/354	(1)	(1)
The student must select 6 units from the following:				(6)
Chamber Music Ensembles	MU	140	series	(1)
Chamber Music Ensembles	MU	340	series	(1)

SINGLE SUBJECT WAIVER IN VOCAL MUSIC

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 I	MU	237		(1)
Diction for Singers	MU	261		(2)
Voice Seminar	MU	277		(5)
Instrumental Techniques for Secondary Education	MU	357		(2)
Vocal Techniques for Secondary Education	MU	367		(2)
Studio Instruction	MU	370		(4)
The student must select 18 units from the following				(18)
Concert Choir	MU	161/361	(1)	(1)
Chamber Singers	MU	164/364	(1)	(1)
Vocal Jazz	MU	165/365	(1)	(1)
Opera Workshop	MU	166/366	(1)	(1)

MUSIC MINOR

Music Appreciation	MU	101		(4)
Introduction to Theory	MU	102		(4)
World of Music *OR*	MU	103		(4)
Introduction to Jazz Styles	MU	110		(4)
Structure of Music: Beginning Harmony	MU	201		(3)
Beginning Conducting	MU	207		(2)
The student must select two of the following:				(2)
String Fundamentals	MU	231		(1)
Brass Fundamentals	MU	232		(1)
Woodwind Fundamentals	MU	233		(1)
Percussion Fundamentals	MU	234		(1)
Voice Fundamentals I	MU	237		(1)
The student must select 6 units from the following:				(6)
Marching Band	MU	151		(1)
Concert Band	MU	152		(1)
Symphonic Wind Ensemble	MU	153		(1)
Jazz Band	MU	154		(1)
Concert Choir	MU	161		(1)
Ethnomusicology Performance	MU	199		(1)
The student must select one of the following:				(4)
History of Music to 1750	MU	404		(4)
History of Music 1750–1900	MU	405		(4)
History of Twentieth Century Music	MU	406		(4)
The student must select 3 units from the following:				(3)
Marching Band	MU	351		(1)
Concert Band	MU	352		(1)
Symphonic Wind Ensemble	MU	353		(1)
Jazz Band	MU	354		(1)
Concert Choir	MU	355		(1)
Chamber Singers	MU	364		(1)
Ethnomusicology Performance	MU	399		(1)

Course Descriptions

MU 100 Introduction to Music (4)

Cross-cultural study of basic elements of music and their applications; music in culture, its values, structures, and functions. 4 lectures/problem solving.

MU 101 Music Appreciation (4)

Introduction to various music cultures in Western civilization. Basic forms, styles, and aesthetics of music. Records, films. 4 lectures/discussions.

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 103 World of Music (4)

Introduction to the musics of the major non-Western culture areas of the world. 4 lectures/problem solving.

MU 105 Concert Attendance (1)

Attendance at and reporting of music department concerts, music hours, recitals, and musicals. Required of all music majors each quarter in residence. 2 hours activity. Total credit limited to 12 units.

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 108 Introduction to Electronic Music (3)

Study of techniques, theories, terminologies, used in synthesized sound and sound modification, including specific functions of individual modules. Direct application and problem solving using analog electronic music instruments. 2 hours lecture/presentation/problem-solving. 2 hours activity. Prerequisite: none.

MU 110 Introduction to Jazz Styles (4)

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. 4 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. Total credit limited to 10 units. 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 Symphonic Wind Ensemble

Training and experience in Wind Ensemble and Wind Symphony music from all periods. Previous experience required. Permission of instructor required. Demonstrated leadership and solo ability required for advanced credit. 3 hrs. 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.

163, 363 Treble Chorus

May be repeated for a total of 8 units.

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

May be repeated for a total of 6 units.

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. Must enroll in at least 6 units. Total credit limited to 10 units. 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: Beginning Harmony (3)

Study and experience in analyzing and writing baroque, classical and popular harmony. Includes: major and minor scales and keys; triads, inversions, and their function; seventh chords, secondary dominants, pivot chords, modulation to closely-related keys. 3 hours lecture/problem solving. Prerequisite: MU 102, or equivalent.

MU 202 Structure of Music: Intermediate Harmony (3)

Study and experience in solving problems related to analyzing and writing late classic, romantic and popular harmony. Incudes: diminished seventh, Neapolitan, augmented sixth chords; chromatic modulation to unrelated keys. 3 hours lecture/problem solving. Prerequisite: MU 201, or equivalent.

MU 203 Structure of Music: Advanced Harmony (3)

Study and experience in solving problems related to analyzing and writing music using late romantic and 20th century compositional techniques. Includes: impressionistic and neo-classic techniques as well as atonality, serialism, indeterminacy, technological influences and minimalism. 3 hours lecture/problem solving. Prerequisite: MU 202 or equivalent.

MU 207 Beginning Conducting (2)

Study of and experience in basic conducting techniques. Problem solving and decision making with regard to tempo, dynamics, performers' ability, difficulty of music, instrumentation, balance, blend, pitch and rhythmic accuracy, and score reading. 2 hours lecture/problem solving. 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 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 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 Musicianship (1)

Student activity using drill and practice methods in sightsinging and dictation of rhythm, melodies and harmonies. Companion lab course to MU 201. 2 hours activity. Prerequisite: MU 102 or equivalent.

MU 222 Musicianship (1)

Student activity using drill and practice methods in sightsinging and dictation of rhythm, melodies and harmonies. Companion lab course to MU 202. 2 hours activity. Prerequisite: MU 221 or equivalent.

MU 223 Musicianship (1)

Student activity using drill and practice methods in sightsinging and dictation of rhythm, melodies and harmonies. Companion lab course to MU 203. 2 hours activity. Prerequisite: MU 222 or equivalent.

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. Total credit limited to 3 units. 2 hours activity. Prerequisite: MU 100, or 102, or equivalent.

MU 237 Voice Fundamentals I (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 238 Voice Fundamentals II (1)

Tone production, breathing, resonance, articulation. Selection and interpretation of vocal literature by performance. 2 hours activity. May be repeated for a total of 3 units. Prerequisite: MU 237 or permission of instructor.

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. May be repeated up to 12 units. 2 hours seminar-discussions.

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. May be repeated up to 12 units. 2 hours seminar-discussions.

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: Modal Counterpoint (3)

Study and experience in solving problems related to analyzing and writing medieval and renaissance music. Includes: medieval notational practices, ecclesiastical modes, rhythmic modes, species counterpoint, imitation. 3 hours lecture/problem solving. Prerequisite: MU 203 or equivalent.

MU 302 Structure of Music: Tonal Counterpoint (3)

Study and experience in solving problems related to analyzing and writing tonal counterpoint. Includes: analysis of inventions and fugues, writing counterpoint, imitation, sequence, and fugal expositions. 3 hours lecture/problem solving. Prerequisite: MU 301 or equivalent.

MU 303 Structure of Music: Form and Analysis (3)

Study and experience in solving problems related to analyzing musical forms. Includes: small song and dance forms, sonata, rondo, concerto, theme and variation. 3 hours lecture/problem solving. Prerequisite: MU 302 or equivalent.

MU 306 Orchestration (3)

Techniques of employing various instrumental combinations. A detailed study of the individual ranges, tone quality, loudness, peculiarities, limitations, and standard practices of the various instruments and their families. 3 hours lecture. Prerequisite: MU 102 or equivalent.

MU 307 Instrumental Conducting (2)

Study of and experience in instrumental conducting techniques. Problem solving and decision making as it pertains to conducting instrumental ensembles. Practical experience in implementing those decisions. 2 hours lecture/problem solving. Prerequisite: MU 207 or equivalent.

MU 308 Choral Conducting (2)

Study of an experience in vocal conducting techniques. Problem solving and decision making as it pertains to conducting vocal ensembles. Practical experience in implementing those decisions. 2 hours lecture/problem solving. Prerequisite: MU 207 or equivalent.

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 Musics of Asia (4)

The high-art musics of South, East, and West Asia; forms, genres, functions of musics in societies. Musical studies related to aesthetics and other values. 4 lecture/problem solving. Prerequisite: MU 100.

MU 317 Women in Music (4)

Study of contributions women have made as composers and performers. An examination of limitations imposed upon women musicians. Recitals by guest lecturers. Student presentation of a culminating study. 4 hours lecture-/discussion. Prerequisite: none.

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 Musicianship (1)

Student activity using drill and practice methods in sightsinging and dictation of rhythm, melodies and harmonies. Companion lab course to MU 301. (Not mandatory to be taken concurrently.) 2 hours activity. Prerequisite: MU 223 or equivalent.

MU 322 Musicianship (1)

Student activity using drill and practice methods in sightsinging and dictation of rhythm, melodies and harmonies. Companion lab course to MU 302. (Not mandatory to be taken concurrently.) 2 hours activity. Prerequisite: MU 321 or equivalent.

MU 323 Musicianship (1)

Student activity using drill and practice methods in sightsinging and dictation of rhythm, melodies and harmonies. Companion lab course to MU 303. (Not mandatory to be taken concurrently.) 2 hours activity. Prerequisite: MU 322 or equivalent.

MU 357 Instrumental Techniques for Secondary Education (2)

Study and student discussion of problems and solutions involved in developing and operating an instrumental music program in secondary schools. 2 hours lecture/problem solving. Prerequisite: MU 231, 232, 233, 234 or equivalent.

MU 367 Vocal Techniques for Secondary Education (2)

Study and student discussion of problems and solutions involved in developing the adolescent voice, as well as developing and operating a vocal music program in secondary schools. 2 hours lecture/problem solving. Prerequisite: MU 237 or equivalent.

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 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 101 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 101 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 101.

MU 408 Computers and Music (3)

Study of digital sound synthesis: techniques, theories, terminology, software, and hardware. Study of computer-assisted instruction software for music. Direct experience in solving problems related to digital sound production and processing. 2 hours lecture/presentation/problem-solving. 2 hours activity. Prerequisite 108 or 208 or consent of instructor.

MU 462 Senior Recital (2)

Selection, practice, rehearsal and completion of a recital under faculty supervision. Required of all music majors. Prerequisite: senior standing, completion of all required coursework necessary for recital preparation. Hours arranged with the advisor and performance area instructor.

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.

David G. Lord, *Chair,* Social Sciences Department

James C. Manley, *Coordinator*
David M. Adams
Kane C. Anyanwu
George E. Derfer
Richard C. Richards
Laurie J. Shrage

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.

The Philosophy Program also offers minors in Philosophy and in Religious Studies. The Philosophy minor enables the student majoring in another discipline to gain critical depth into different perspectives, assumptions, and values. This minor offers the student breadth, yet can be adapted to specific vocational and professional interests.

The Religious Studies minor serves students interested in deepening their awareness of issues arising in the academic study of religion, an area of study involving both the humanities and the social sciences. This minor is useful for students considering professional work in religion or for lay-persons in strengthening their grasp of the historical and conceptual aspects of religious traditions and of religious experience.

Students interested in international themes and issues will benefit from either of these two minors.

CORE COURSES FOR MAJOR *

(Required of all students)

Ethics	PHL	204	(4)
World Religions: Oriental	PHL	210	(4)
World Religions: Mediterranean	PHL	211	(4)
Philosophy of Religion	PHL	303	(4)
Contemporary Ethical Problems	PHL	309	(4)
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)

4 units to be taken from the following:

Philosophy of Justice	PHL	415	(4)
Medical Ethics	PHL	433	(4)
Social Philosophy	PHL	480	(4)

4 units to be taken from the following:

Philosophy of the Arts	PHL	301	(4)
Myth, Symbol and Ritual	PHL	466	(4)
Film Aesthetics	PHL	468	(4)

The student must complete 12 additional units of upper division philosophy or related courses chosen in consultation with an advisor. Acceptable related courses include the following (no more than 8 units from political science):

Language and Human Behavior	ENG	313	(4)
History and Historians	HST	470	(4)
Jurisprudence	PLS	405	(4)
Modern Political Thought	PLS	432	(4)
Marxism	PLS	435	(4)

* A 2.0 cumulative GPA is required in core courses including opption courses for the major in order to receive a degree in this major.

SUPPORT COURSES

(Required of all students)

Intro to Cultural Anthropology	ANT	102	(4)
or			
Principles of Sociology	SOC	201	
Freshman English II	ENG	105	(4)
History of Civilization	HST	102	(4)
History of Civilization	HST	103	(4)
Unrestricted electives			(42)

GENERAL EDUCATION REQUIREMENTS

Category I: (Pattern 1)

Freshman English I	ENG	104	(4)
Public Speaking	COM	100	(4)
Logic and Semantics	PHL	202	(4)

Category II: (Pattern 2)

A. Select one course			(4)
B. Select one course			(4)
C. Select one course			(4)
D. Select one course			(4)

Category III

A. Select one course			(4)
B. History of Civ.: The Ancient Wld	HST	101	(4)
C. Select one course			(4)

Category IV

A. Principles of Economics	EC	201	(4)
B. Cultural Geography	GEO	102	(4)
C. Select one course			(4)

Category V

Select one course			(4)

Category VI

Group 1:

American Civilization	AMC	201	(4)

Group 2:
American Civilization ..... AMC 202 (4)

Category VII
12 Upper Division units are required from a Theme or Depth package, 4 of which may replace lower division units in Category II, III or IV. See Advisor. ..... (8)
Total Units required for degree ..... (186)
(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)

RELIGIOUS STUDIES MINOR

World Religions: Oriental ..... PHL 210 (4)
World Religions: Mediterranean World . PHL 211 (4)
Philosophy of Religion ..... PHL 303 (4)
Myth, Symbol, and Ritual ..... PHL 470 (4)

One of the following courses:
Modern Religious Trends ..... PHL 306 (4)
American Indian Thought and Religion . PHL 307 (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)

One of the following courses:
Anthropology of Religion ..... ANT 360 (4)
American Dreams, Myths, and Realities. AMS 450 (4)
Ethnic Thought and Value ..... EWS 430 (4)
Religion in American History ..... HST 415 (4)

Total units required for Minor ..... (24)

Course Descriptions

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-problem solving.

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-problem solving.

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-problem solving.

PHL 205 Business and Professional Ethics (4)

An analysis of major ethical traditions with a focus on the nature of obligations, right action, responsibility and altruism. Applications to issues concerning business and society. 4 lecture-problem solving.

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-problem solving.

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-problem solving.

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-problem solving.

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 lectures-problem solving.

PHL 306 Modern Religious Trends (4)

Critical survey of religious thought in the 20th century, including neo-orthodoxy, social-gospel, fundamentalism, process-thought, death-of-God, civil-religion, liberation-theology, theology-of-hope, narrative theology, and neo-Roman Catholic thought, and world religion. 4 lecture/problem solving.

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-problem solving.

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-problem solving.

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-problem solving.

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-problem solving.

PHL 314 History of Modern Philosophy (4)

Great philosophical ideas and thinkers from Descartes to the 20th century; Continental and British schools. 4 lecture-problem solving.

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-problem solving.

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-problem solving.

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-problem solving.

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-problem solving.

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-problem solving.

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-problem solving.

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-problem solving.

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-discussion. Prerequisites: PHL 211 or 212 or 213; PLS 431 or 432; or permission of instructor.

PHL 415 Philosophy of Justice (4)

Seminar on the meanings of justice, especially social justice. Subject areas include distributive justice, retributive justice, and the relationship between justice, freedom, and human rights. 4 seminar/discussion. Prerequisite: PHL 201 or equivalent.

PHL 433 Medical Ethics (4)

Seminar in current issues occasioned by new medical technology. Includes defining death, informed consent, autonomy, allocating scarce medical resources, and ethical theory. Primarily designed for philosophy, pre-med, and health sciences students. 4 seminar/discussion. Prerequisite: PHL 201 or equivalent.

PHL 459 Epistemology (4)

Seminar in the scope and limits of human knowledge and its relationship to metaphysics: the relationship between knowledge and certainty, the conduct of inquiry in the sciences and humanities, rationalism, empiricism, the relationship of the knower to the known. 4 seminar/discussion. Prerequisite: PHL 201 or equivalent.

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-problem solving.

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 lecture-discussion.

PHL 466 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-problem solving.

PHL 468 Film Aesthetics (4)

Topical approach to film aesthetics; role of myth, psychology, literature, politics, science-fiction, and the popular arts in the aesthetic value of film. Films will be primarily from local sources. 3 lecture-problem solving. 2 hours activity.

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-problem solving.

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-problem solving.

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, and Recreation is physical education. For the other program offered in the department, see recreation administration.

Bruce Coulter, *Chair*
Stanley L. Bassin
Raymond C. Daugherty
Ronald W. Deitrick
Katherine de Wet
Roy C. Easley
George Eisen
Lynne Emery
Aubrey Fine
Barbara H. Ford
Otto F. W. Gasser
Gus. J. Gerson, Jr.
Leon S. Jackson
Frank D. Lansford
Sam Lollar
Gregory H. Marks
G. S. Don Morris
Mary Jo Oliver
Robert E. Pfister
Wanda Rainbolt
Arthur Ridgway
John H. Scolinnos
Josie M. Sifft
Priscilla F. Stromer
Leo H. Teghtmeyer

The department offers a curriculum designed to meet a variety of student needs and interests. Specific programs are provided for students who want to enter the teaching, coaching, health and fitness, athletic training, and adapted physical education fields. Those students who complete in-depth specializations in adapted physical education, athletic training, and exercise science can receive departmental certification in these areas. Our major program qualifies students to pursue a California teaching credential which makes them eligible to teach physical education or adapted physical education in public and private schools. The department also has selected coursework which would qualify students with a major other than physical education to earn a physical education teaching credential (a supplementary authorization). Departmental certification programs are also available for students with majors other than physical education who complete certificate requirements in the exercise science or coaching areas. Students should consult their advisor regarding the specifics of each program.

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 section of this catalog.

In addition to serving its own majors, the department curriculum also provides required and elective courses in physical education and health to meet the general education needs of all students. The intramural sports program offered by the department provides recreational and competitive activities for students and faculty from all areas of the University.

The academic program for the Recreation Administration major is described in this catalog under that heading.

PHYSIOLOGY MINOR

The Physiology Minor is an interdisciplinary program which can be elected by students majoring in any field. Its purpose is to improve the training and advising of students in order to facilitate their pursuit of careers in biomedical fields utilizing a knowledge of Physiology. It is particularly appropriate for students majoring in Physical Education.

A full description of the minor is located in the "University Programs" section of this catalog.

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. and Sport	PE	210	(4)
or Philosophy of P.E.		310	(3)
Anatomical Kinesiology	PE	302	(4)
Physiology of Exercise	PE	303	(4)
Motor Development	PE	312	(4)
Computer Applications in PE	PE	375	(3)
Tests and Measurements	PE	425	(4)
Motor Learning	PE	430	(4)
Senior Seminar	PE	463	(4)
or Senior Project	PE	461	
and Senior Project	PE	462	
Designated PE—Area I, II, or III			(38-60)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Contemporary Aspects of Nutrition	FN	205	(4)
or Nutrition and Nutrition Lab	FN	235, 236	
Human Anatomy	ZOO	234	
Human Physiology	ZOO	235	

General Education Requirements

(Required of all students)

Category I
Follow either pattern (12)

Category II

A. Select one course			(4)
B. Fundamentals of Chemistry	CHM	103	(4)
or College Chemistry and	CHM	104	
College Chemistry Lab	CHM	141	
or Fundamentals of Physics	PHY	102	
or Fundamentals of Earth Science	GSC	101	
C. Basic Biology	BIO	115	(5)
D. Select one course			(4)

Category III
A. Introduction to Dance ..... DAN 202 (4)
B. Introduction to Philosophy ..... PHL 201 (4)
or Ethics ..... PHL 204
or Business and Professional Ethics ..... PHL 205
C. Select one course ..... (4)

Category IV (one course may be upper division, see advisor)
A. Select one course ..... (4)
B. Select one course ..... (4)
C. Select one course ..... (4)

Category V
Health, Nutrition, and the Integrated Being ..... CPU 202 (4)
or General Psychology ..... PSY 201

Category VI
American Civilization ..... AMC 201 (4)
or Introduction to American Government ..... PLS 201
American Civilization ..... AMC 202 (4)
or United States History ..... HST 202

Category VII
Upper Division. See Advisor ..... (8)

Teaching Emphasis

Field work for Prospective PE Teachers ..... PE 204 (3)
Basketball, Field Hockey, Soccer Theory ..... PE 212 (3)
Weight Training, Archery, Swimming Theory ..... PE 213 (3)
Tumbling, Apparatus, Track and Field Theory ..... PE 214 (3)
Badminton, Golf, Tennis Theory ..... PE 215 (3)
Softball, Flag Football, Volleyball Theory ..... PE 216 (3)
Folk and Square Dance Theory ..... PE 217 (3)
Sec. School Health Educ. ..... PE 442 (3)
Developmental Movement for Children. PE 328 (3)
Admin. of Physical Education and Athletics ..... PE 420 (4)
Physical Education Curriculum ..... PE 440 (4)
Role of Sport in Contemporary Society. PE 450 (4)

Exercise Science Emphasis

Biomechanical Kinesiology ..... PE 402 (3)
Physiology of Exercise II ..... PE 403 (4)
Athletic Training ..... PE 432 (4)
Adult Fitness—Theory and Practice ..... PE 453 (3)
Clinical Exercise Testing and Counseling. PE 454 (4)
College Chemistry ..... CHM 105 (3)
College Chemistry Lab ..... CHM 142 (1)
Nutrition of the Life Cycle ..... FN 335 (3)
Behavior Management ..... PSY 450 (4)
Approved Electives, See Advisor ..... (24)

Alternative Careers Emphasis

Ten different PE activity courses ..... (10)
Role of Sport in Contemporary Society. PE 450 (4)
Hist., Phil., and Theory of Recreation .. REC 141 (4)
Approved Electives, See Advisor ..... (20)

Athletic Training Emphasis

Complete at least 1 course from each of the following groups:

GROUP A
1 PE 114 Aerobic Exercise
1 PE 105 Bicycling
1 PE 119 Jogging

GROUP B
1 PE 104 Baseball
1 PE 113 Field Hockey
1 PE 126 Soccer
1 PE 128 Softball

GROUP C
1 PE 102 Basketball
1 PE 163 Beg. Volleyball

GROUP D
1 PE 167 Beg. Tennis
1 PE 133 Racquetball

Complete each of the following:
1 PE 159 Beg. Gymnastics
1 PE 161 Beg. Swimming
1 PE 165 Beg. Weight Training
4 PE 308 Drug Education
3 PE 402 Biomech. Kinesiology
4 PE 403 Physiol. of Exer. II
4 PE 406 Orthoped. Hlth. Imp.
4 PE 420 Admin. PE & Ath.
4 PE 428 Sports Psych. *or*
4 PSY 201 General Psychology
4 PE 432 Athletic Training
3 PE 433 Adv. Athletic Trng.
3 PE 435 Ath. Tr. Ther. & Mod.
2 PE 437 Ath. Tr. Practicum
3 PE 453 Health/Fitness Prog.
4 PE 455 Sports Medicine

Course Descriptions

PE 100 Adaptive Activities (1)

Activity programs designed to meet the needs of students who do not participate in regular physical education activity classes. Will aid students with special needs (permanent or temporary) achieve physical, mental, emotional and social growth. Two hours activity.

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. May be taken on a credit/no credit basis. **NOTE: On the first class day of each new quarter all activity classes meet in the main gymnasium, bldg. 43.**

101 Backpacking
102 Basketball
104 Baseball
105 Bicycling
106 Bowling
108 Folk Dance
110 Square Dance
111 Social Dance
112 Fencing
113 Field Hockey
114 Aerobic Exercise
119 Jogging
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
136 Skiing
145 Beginning Archery
147 Beginning Badminton
148 Advanced Badminton
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 181–195 Competitive Athletics (2)

May be taken by those students who compete on an intercollegiate athletic team and may be repeated for additional credit as long as normal academic progress is maintained.

182 Intercollegiate Baseball
183 Intercollegiate Basketball
184 Intercollegiate Soccer (Women)
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 and discipline. Exploration of subdisciplines and career opportunities in the field. Critical analysis and evaluation of literature, philosophy, and scientific basis. 4 lecture/discussion/problem solving.

PE 204 Field Work for Prospective Physical Education Teachers (3)

Observation and critical case study analysis of elementary and secondary physical education programs in preparation for student teaching experiences. Selected educational programs and teaching methodologies are analytically reviewed. 1 lecture/problem solving, 2 two-hour workshops.

PE 205 First Aid (3)

Instruction in the immediate and temporary care of injuries and sudden illness taken from the standard, advanced and instructor's American Red Cross first aid courses. Practice in using life saving equipment. 2 lectures, 1 two-hour laboratory.

PE 206 Introduction to Adapted Physical Education (3)

Techniques for teaching physical education to persons with handicapping conditions. Handicapping conditions, program adaptations, and mainstreaming plus observation of selected programs. 3 hours lecture/problem solving.

PE 210 History of Physical Education and Sport (4)

Discussion of physical education and sport from earliest times to the present; concentration on political, religious, and social bases of societies and the effect of these beliefs on the physical education/sport of each culture. Emphasis on the United States. 4 lecture/discussion.

PE 212 Basketball, Field Hockey, and Soccer Theory (3)

Analysis of the instructional process in teaching basketball, field hockey and soccer. Instruction includes mainstreaming of disabled students. 6 hours educational workshop. Prerequisites: PE 102, PE 113 and PE 126 with a grade of A or B, or permission of instructor.

PE 213 Weight Training, Archery, and Swimming Theory (3)

Analysis of the instructional process in teaching weight training, archery and swimming. Instruction includes mainstreaming of disabled students. 6 hours educational workshop. Prerequisites: PE 145, PE 161 and PE 165 with grades of A or B, or permission of instructor.

PE 214 Tumbling, Apparatus, and Track and Field Theory (3)

Analysis of the instructional process in teaching tumbling, gymnastic apparatus and track and field. Instruction includes techniques of mainstreaming students with disabilities. 6 hours educational workshops. Prerequisites: PE 159 or permission of instructor.

PE 215 Badminton, Golf and Tennis Theory (3)

Analysis of the instructional process in teaching badminton, golf and tennis. Instruction includes mainstreaming of disabled students. 6 hours educational workshops. Prerequisites: PE 147, PE 157 and PE 167 with grade of A or B, or permission of instructor.

PE 216 Softball, Flag Football, and Volleyball Theory (3)

Analysis of the instructional process in teaching softball, flag football and volleyball. Instruction includes techniques of mainstreaming students with disabilities. 6 hours educational workshops. Prerequisites: PE 128, 163 with grade of "A" or "B" or permission of the instructor.

PE 217 Folk and Square Dance Theory (3)

Theory, analysis, philosophy of folk and square dance as a fine art; their place in our educational system. 2 lecture/discussion, 1 two-hour fine arts activity. Prerequisite: PE 202

PE 221 Wrestling Theory (3)

Analysis and demonstration of strategy and skill of wrestling with application of principles to coaching. 2 lectures/problem solving. 1 two-hour educational workshop.

PE 231 Basic Scuba (4)

Use of scuba apparatus and its application as an adjunct to marine studies. Includes concepts of diving medicine, physics, oceanography and its scientific application. Leads to basic diver certification. 2 lecture/problem solving, 2 two-hour technical activities. Prerequisites: swim test, permission of instructor, current physical examination.

PE 232 Scuba Safari (2)

Introduction to diving environments outside Southern California. Includes on-site investigation of marine ecological changes along the Northern California and Mexican coasts. Scientific application of gas laws, principles and effects of underwater pressure on metabolism. Prerequisites: basic scuba certification, completion of CSU diving registration requirements, permission of instructor. Recommended that BIO 220 be taken concurrently. 10 hour lecture/problem solving, 20 hours technical activity.

PE 275 Gymnastics Theory (3)

Analysis and demonstration of the instructional processes in teaching and coaching gymnastics. 2 lecture/problem solving, 1 two-hour educational workshop.

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 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. Laboratory analysis of strength, coordination, flexibility, endurance, fatigue, conditioning and related factors to human movement and athletic performance. 3 lecture/discussion, 1 three-hour technical laboratory. Prerequisite: ZOO 235.

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. Prerequisite: CPU 202.

PE 308 Drug Education (4)

Drugs in contemporary society; drug abuse; controlling factors; federal and state drug laws. 4 lecture-discussions.

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. Examination of skill development thru case studies, cross sectional and longitudinal descriptive research. 4 hours lecture/problem solving. Prerequisites: junior or senior standing or permission of instructor.

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 321 Football Theory (3)

Analysis and demonstration of the instructional processes in teaching football with application of principles to coaching. 2 hours lecture/problem solving, 1 two-hour educational workshop.

PE 323 Baseball and Softball Theory (3)

Analysis and demonstration of the instructional processes in teaching baseball and softball with application of principles to coaching. 2 hours lecture/problem solving, 1 two-hour educational workshop.

PE 325 Basketball Theory (3)

Analysis and demonstration of the instructional processes in teaching basketball with application of principles to coaching. 2 hours lecture/problem solving, 1 two-hour educational workshop.

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)

Analysis of the instructional processes in teaching elementary physical education. Basic skill movements used in developmental games, developmental gymnastics and developmental rhythms. 2 lecture/discussion, 1 two-hour educational workshop.

PE 333 Track and Field Theory (3)

Analysis and demonstration of the instructional processes in teaching track and field. 2 hours lecture/problem solving, 1 two-hour educational workshop.

PE 337 Sports Officiating (4)

Analysis and demonstration of principles and techniques of officiating sports offered in the school program. 2 hours lecture/problem solving. 2 two-hour educational workshops.

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 350 Intramural Sports (3)

Principles, policies, procedures and case studies underlying the program of intramural sports in institutions of elementary, secondary and higher education. Experience in conducting programs. 2 hours lecture/discussion, 1 two-hour educational workshop.

PE 355 Adapted Aquatics (3)

Theory and practical aspects of teaching swimming and water related activities to special populations. 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.

PE 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)

Analysis and demonstration of the instructional process of teaching swimming pool activities; beginning and intermediate diving; water polo skills and strategy; orientation to pool equipment and maintenance; introduction to aquatic games and pool safety. 2 hours lecture/problem solving, 2 two-hour educational workshops. Prerequisite: PE 161 or permission of instructor.

PE 370 Stress Management for Healthy Living (3)

Stress management and its relationship to health, disease, and motor performance. Analysis of everday stressors and intervention strategies for managing stress effectively. Three lecture/problem solving. Prerequisite: Upper division standing or permission of instructor.

PE 375 Computer Applications in Physical Education (3)

Hands-on experience with software related to physical education that can facilitate professional effectiveness. 2 lecture/problem solving, 1 two-hour educational workshop. Prerequisite: PE 201 or permission of instructor.

PE 379 Advanced Scuba Techniques (4)

Advanced knowledge and skills required for use of scuba in studying the marine environment. Continuation of study in diving medicine, physics and oceanography; scientific methods for marine study. 2 lecture/discussion, 2 two-hour technical activities involving field work. Prerequisites: basic scuba certification, completion of CSU diving registration requirements, permission of the instructor. Recommended that ESC 335 be taken concurrently.

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 401 Motor Assessment for Special Populations (4)

General motor assessment strategies for handicapped populations. Emphasis on descriptive and limiting performance tests. Matching data to program development. 3 lectures, 1 two-hour activity. Prerequisite: PE 206, or graduate standing, or permission of instructor.

PE 402 Biomechanical Kinesiology (3)

Introduction to biomechanical analysis of sport performance. Concepts involving fundamental physics required to describe human performance. Examination and student presentations of individual sport performances. 3 lecture/presentations. Prerequisites: PE 302.

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. Influence of exercise on health and aging. Assessing circulatory function, oxygen consumption and efficiency in laboratory. 3 lecture/discussions, 1 three-hour technical laboratory. Prerequisite: PE 303.

PE 404 Rhythms and Dance for Movement Education (3)

Designing dance and rhythmic programs basic to development of movement patterns for instruction of normal and atypical individuals. Analysis and demonstration of dance curriculum for different levels of motor development. Includes clinical and fieldwork experiences. Meets state requirements for adapted physical education credential. 2 lecture/problem solving, 2 hours educational workshop. Prerequisite: DAN 202 or Consent of Instructor.

PE 405 Adapted Physical Education Fieldwork (3)

Supervised clinical and mainstreamed public school experience in adapted physical education at selected public school sites and in Cal Poly's Motor Development Clinic. May be repeated three times for a total of 9 units. 2 hours clinical processes, 2 one-hour educational workshops. Prerequisites: Upper division status and permission of instructor.

PE 406 Physical Education for Orthopedically and Health Impaired (4)

Techniques for developing/implementing physical activity programs for orthopedically handicapped and other health impaired individuals, e.g., cardiovascular, cardiorespiratory conditions. 3 lectures, 1 two-hour activity. Prerequisites: PE 206, 302, 303 and 401, or graduate standing, or permission of instructor.

PE 410 Physical Activity for Mentally Handicapped and Emotionally Disturbed (4)

Techniques for developing/implementing physical activity programs for the mentally handicapped and emotionally disturbed populations. 3 lectures, one 2-hour activity. Prerequisite: PE 206 or permission of instructor.

PE 420 Administration of Physical Education and Athletics (4)

Study of the underlying philosophy and principles of administrative theory and practice. Legal aspects and safety policies for athletics and physical education programs. 4 hours lecture/presentations. Prerequisites: upper division standing or permission of instructor.

PE 425 Tests and Measurements in Physical Education (4)

Techniques and principles involved in assessing the outcomes of instruction and participation in physical education. Emphasis on student selection, preparation, administration and application of standardized evaluative instruments. 3 hours lecture/problem solving, 1 two-hour technical activity.

PE 428 Sports Psychology (4)

Analysis and evaluation of literature concerned with the training and motivation of secondary- and college-level athletic performers. Prerequisite: senior standing, SOC 201, or PSY 201, or permission of instructor. 4 lecture-discussions.

PE 430 Motor Learning and Human Performance (4)

Student analysis of the perceptual and sensory systems involved in neuromuscular performance. Laboratory demonstration of the role of kinesthesis, reaction time, and strength in neuro-motor coordination and motor learning; transfer factors affecting motor performance. 3 hours lecture/problem solving, 1 three-hour technical laboratory. Prerequisites: PE 303, 425 and permission of instructor.

PE 432 Athletic Training (4)

Clinical approach to the 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 clinical lectures, 1 two-hour technical activity. Prerequisites: ZOO 234 or permission of instructor.

PE 433 Advanced Athletic Training (3)

Advanced clinical methods for prevention, examination, evaluation and rehabilitation of athletic injuries; advanced taping techniques; diets; fitting of protective pads and equipment. 3 clinical lectures. Prerequisites: PE 205, 302, 303, 432; ZOO 234, 235.

PE 435 Athletic Training Therapy and Modalities (3)

Clinical use of exercise and modalities for the care and rehabilitation of athletic injuries. Emphasis on the clinical and physiological reasoning and actual utilization of specific modalities and exercise. 2 hours lecture/problem solving, 1 two-hour educational workshop. Prerequisites: PE 432, 433.

PE 437 Athletic Training Practicum (2)

Practical experience in an athletic training facility under the direction of a certified athletic trainer. May be repeated once for credit. 40 hours per quarter. 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 interscholastic programs, curriculum models, and purpose-process curriculum framework. 4 lectures. Prerequisite: PE 204, upper-division standing.

PE 441 Elementary School Health Education (3)

Methods, processes, and content used in the elementary schools, including middle schools, for teaching health and for dealing with health-related problems. Satisfies the health education requirement for the California Multiple Subject Credential. 2 discussion/problem solving, 1 two-hour educational workshop. Prerequisite: Upper division standing.

PE 442 Secondary School Health Education (3)

Methods, processes, and content used in secondary schools, including middle schools, for teaching health and for dealing with health-related problems. Satisfies the health education requirement for the California Single Subject Credential. 2 discussion/problem solving, 1 two-hour educational workshop. Prerequisite: Upper division standing.

PE 448 Modern Olympic Games (4)

International perspectives of the modern Olympic Games from 1896 to present. 4 lecture/discussions. Prerequisite: PE 210 or permission of instructor.

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, or PSY 201, or ANT 102.

PE 453 Principles of Health/Fitness Programs (3)

Theoretical basis and techniques of developing and implementing adult fitness programs. Components of adult fitness; fitness as a lifestyle; industrial and community-based programs and fitness programs for the cardiac. Student presentations required. 3 hour lecture/presentation. Prerequisite: PE 303.

PE 454 Clinical Exercise Testing and Counseling (4)

Theoretical and applied principles of graded exercise testing (GXT), interpretation, counseling and exercise leadership. Current certification programs, basic exercise electrocardiography, energy cost calculations, and special considerations for select population groups. Student presentations required. 3 hours lecture/presentation, 1 two-hour lab. Prerequisite: PE 303.

PE 455 Sports Medicine (4)

Current topics in sports medicine as they affect human performance including ergogenic aids; age and sport performance; overtraining; sports anemia; blood doping; and other selected contemporary topics. Student presentations required. Two 2-hour lecture/presentations. Prerequisite: PE 303 strongly recommended.

PE 456 Exercise Metabolism and Weight Control (3)

Metabolism and energy demands of physical activity. Pathophysiology and etiology of obesity and other eating disorders (anorexia and bulimia) related to activity. Role of exercise, diet and behavior changes in treatment and prevention of obesity. Body composition assessment. Student presentations required. 3 lecture/presentation. Prerequisites: PE 303, FN 205.

PE 457 Scientific Foundations of Physical Activity (3)

Basic scientific principles from exercise physiology, kinesiology and motor learning applied to dance, sport and physical education programs. Designed for the student with minimal scientific background seeking knowledge and understanding in the scientific area of physical education. Student presentations required. 3 hours lecture/presentations.

PE 458 Exercise Physiology Fieldwork (3)

Fieldwork in exercise physiology. Supervised clinical laboratory experience in Cal Poly's Exercise Physiology Laboratory. 1 hour clinical processes, 2 two-hour educational workshops. Prerequisites: upper division status, PE 303, and permission of instructor.

PE 459 Health/Fitness Instructor (3)

Description: Knowledge and competencies related to working with apparently healthy populations in a variety of health/fitness settings. Information specifically pertaining to the Health/Fitness Instructor Certification of the American College of Sports Medicine. 3 hours lecture/problem solving. Prerequisites: PE 303, 458 and current CPR certification.

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)

Issues, practices, and trends in the professions. Other material relevant to graduating seniors. 4 seminar/discussions. Prerequisite: senior standing or permission of instructor.

PE 469 History of Women in Sport (4)

Women's role in sport from ancient Egypt and Greece to present. Includes individual athletes and women's contributions to the growth and development of sport. 4 hours lecture.

PE 471 Advanced Coaching Strategies in Baseball/Softball (3)

Analysis and demonstration of team and individual strategies and coaching tactics. Analysis of advanced baseball/softball skills, effective coaching techniques, theoretical and practical application of officiating. 2 hours lecture/presentation, 2 hours educational workshop. Prerequisites: PE 323 or permission of instructor.

PE 472 Advanced Coaching Strategies in Basketball (3)

Analysis and demonstration of team and individual strategies and coaching tactics. Analysis of advanced basketball skills, effective coaching techniques, theoretical and practical application of officiating. 2 hours lecture/-problem solving, 2 hours educational workshop. Prerequisites: PE 325 or permission of instructor.

PE 474 Advanced Coaching Strategies in Track/Field (3)

Analysis and demonstration of team and individual strategies and coaching tactics. Analysis of advanced track and field skills, effective coaching techniques, theoretical and practical application of officiating. 2 hours lecture/-problem solving, 2 hours educational workshop. Prerequisites: PE 333 or permission of instructor.

PE 498 Professional Organizations in Physical Education Seminar (2)

Analysis of professional organizations in the physical education field. Includes attendance at state or national level conferences. 2 hours seminar.

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

Ronald M. Peterson, *Chair*

Mohammed A. Al-Saadi
Ruben Arminana
Barbara J. Burt-Way
Howard Gillman
Bruce F. Grube
George P. Hart
John L. Korey
José M. Vadi

The political science program is designed to provide students with the opportunity to acquire the kind of broad and rigorous education needed for life now and in the Twenty-First Century. The best career and life preparation is one which produces individuals who are both educated in the best traditions of learning and equipped to adapt to constant and rapid change.

The department offers courses leading to the degree of Bachelor of Arts in Political Science. Within this major, two options are offered. The first, a general option in political science, offers a selection of coursework spanning the subfields of the discipline. The second, in public administration, also provides broad coverage of the discipline of political science, but devotes special attention to developing the competencies needed by managers in the public sector. Both options provide a large number of units of free electives in order to ensure flexibility and permit students to tailor their curricula to individual interests, needs, and career goals. For students in majors other than political science, the department offers minors in political science and in public administration.

A special feature of the public administration option and the public administration minor is that these programs are available to both day and evening students.

Students majoring in political science who have at GPA of at least 3.0 overall and 3.5 in the 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.

The Political Science Department, in cooperation with Cal State, Northridge, offers an external (not State supported) Master of Public Administration (M.P.A.) program for persons who are employed in the public sector. For information, contact the Department Office.

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)

** POLITICAL SCIENCE SUBFIELDS

American Politics: PLS 323, 324, 325, 326, 327, 328, 426, 427;
Comparative Politics: PLS 342, 441, 442, 443, 444, 445, 446, 447;
International Relations: PLS 452, 453, 454, 455, 456;
Political Theory: PLS 431, 432, 433, 435, 436, 438, 439;
Public Administration: PLS 314, 315, 316, 413, 414, 415, 471, 472;
Public Law: PLS 401, 404, 405, 406, 407;

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

PUBLIC ADMINISTRATION

Public Administration	PLS	314	(4)
Public Policy Administration	PLS	315	(4)
Bureaucracy and Administrative Behavior	PLS	316	(4)
Government Revenue Administration	PLS	413	(4)
Government Budget Administration	PLS	414	(4)
Government Personnel Administration	PLS	415	(4)
Additional courses in Political Science			(24)

SUPPORT AND ELECTIVE COURSES

(Required in specific options)

POLITICAL SCIENCE

Free Electives ..... (46) #

PUBLIC ADMINISTRATION

Select EITHER A OR B:

A) Complete minor in Accounting, Administrative Management, Business Computer Programming, Criminal Justice and Corrections, Human Resource Management or, by petition, other minor which develops a significant set of skills directly related to the practice of public administration (see advisor).

B) Choose 3 courses from the following:

Prin of Acctg	ACC	224	(4)
Intro to Mgrl Acctg	ACC	225	(4)
Comp Meth in Behav Sci	BHS	340	(4)
Intro to Comp Syst	CIS	110	(4)
Public Finance	EC	301	(4)
St & Loc Govt Fin	EC	430	(4)
Urban Economics	EC	432	(4)
Human Resources Mgmt	MHR	311	(4)
Communication for Mgmt	MHR	324	(4)
Training & Devel	MHR	405	(4)
Advanced Mgmt Com Seminar	MHR	424	(4)
Ind & Pers Psych	PSY	332	(4)
Psychol Testing	PSY	416	(4)

Urban Sociology..... SOC 401 (4)
Prin of Urban Planning ..... URP 301 (4)
Free Electives .....(14–50) #
the total curriculum must include 60 units of upper division courses

GENERAL EDUCATION REQUIREMENTS

Category I (Pattern 2)
A. Freshman English I ..... ENG 104 (4)
B. Advocacy and Argument..... COM 204 (4)
C. Freshman English II..... ENG 105 (4)

Category II
A. Elementary Statistics..... STA 120 (4)
B. Select one course.....(4)
C. Select one course .....(4)
D. Select one course .....(4)

Category III
Select one course from each area.
Total .....(12)

Category IV
A. Principles of Economics..... EC 202 (4)
B. Select one course.....(4)
C. United States History..... HST 201 (4)

Category V
Political Science Option, select one course .....(4)
Public Administration Option,
General Psychology..... PSY 201 (4)

Category VI
1. Intro American Govt..... PLS 201 (4)
2. United States History ..... HST 202 (4)

Category VII
Select one theme or depth package, 4 units from which may be used to replace a Cat II, III, or IV lower division course .....(8)

POLITICAL SCIENCE MINOR

Comparative Political Sys ..... PLS 202 (4)
Intro to Political Thought..... PLS 204 (4)
OR Intro to Research Methods..... PLS 205
Additional courses from at least two subfields (*) of political science .....(20)
Total units required for minor .....(28)

* POLITICAL SCIENCE SUBFIELDS

American Politics: PLS 323, 324, 325, 326, 327, 328, 426, 427;
Comparative Politics: PLS 342, 441, 442, 443, 444, 445, 446, 447;
International Relations: PLS 452, 453, 454, 455, 456;
Political Theory: PLS 431, 432, 433, 435, 436, 438, 439;
Public Administration: PLS 314, 315, 316, 413, 414, 415, 471, 472;
Public Law: PLS 401, 404, 405, 406, 407;

PUBLIC ADMINISTRATION MINOR

Required of all students:
Public Administration..... PLS 314 (4)
Public Policy Administration..... PLS 315 (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 224 (4)
Introduction to Managerial Accounting. ACC 225 (4)
Computer Methods in Behav Sci ..... BHS 340 (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)
Principles of Organizational Theory and Behavior ..... MHR 301 (4)
Bureaucracy and Administrative Behavior ..... PLS 316 (4)
Business and Public Policy ..... PLS 318 (4)
American State & Local Politics ..... PLS 328 (4)
Government Revenue Administration .. PLS 413 (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)

QUANTITATIVE RESEARCH MINOR

The Quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Political Science. A full description of this minor is included in the "University Programs" section of this catalog.

Course Descriptions

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)

Writings of selected philosophers on central questions of political life such as: What is the best political order? Who should rule? What is the nature of freedom and liberty? Equality? Justice? Rights? The public interest? Power? 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; STA 120.

PLS 290/SOC 290 Political Sociology (4)

Social bases of the political process. Socialization, participation, elite-mass relationships. Influence of factors such as class, race, religion, and sex on political attitudes and behavior. Course listed as both, PLS 290 and SOC 290. Meets General Education requirements in Categories IV B & C for Electrical and Computer Engineering and Industrial and Manufacturing Engineering only. Not open to Political Science or Behavioral Sciences majors. 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 318 Business and Public Policy (4)

Affect individual businesses and trade associations have on the development and implementation of public policy at all levels of government and the affect government policies, at all levels, have on business. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201

PLS 323 American Ethnic Politics (4)

The ethnic factor in politics; theoretical literature relating ethnicity to politics; ethnicity, class, and politics; political organization and mobilization. Emphasis on the California experience. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 324 Political Parties and Interest Groups (4)

Party organization, political campaigns, and elections. Impact of interest groups on government activity and programs. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 325 The American Congress (4)

Congress as a political subsystem; relations between Congress and other branches of American government; comparisons and contrasts betwen Congress and other legislative bodies. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 326 The American Federal Executive (4)

Executives as subsystems within the federal political system: behavior, processes, and functions. Emphasis on constitutional underpinnings and institutionalization of the American presidency, on other executive components, and on the frictions created by competing values in the administrative process. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 327 The American Federal Judiciary (4)

Courts as political subsystems; jurisprudential considerations in the American political context; judicial roles and behaviors; historical development; comparative judicial systems. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 328 American State and Local Politics (4)

Comparative analysis of the structures and functions of state and local governments, with emphasis on California. Examination of the relationships among the several levels of government in American federalism. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 342 Political Development (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 once for credit. Seminar, 4 hours. 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 Public Law: Governmental Powers (4)

Influence of public 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 relationships; administrative law. Seminar, 4 hours. 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, courts—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 406 Women and the Law (4)

Examination of ways that law has helped to create and to challenge gender roles; family, reproduction, child custody; education and employment; strategies for change. 4 lecture discussions. Prerequisite: PLS 201 or AMC 201.

PLS 407 Public Law: Rights and Liberties (4)

Influence of public law on civil liberties and civil rights. Relation of Constitution to personal liberty; procedural rights; freedom of religion, speech, press, assembly; due process; equal protection. Seminar, 4 hours. Prerequisite: PLS 201 or AMC 201.

PLS 413 Government Revenue Administration (4)

Theory and practice of government revenue management. Use taxes, user charges, intergovernmental transfers and subventions, and various debt instruments to finance operating budgets and capital projects. 4 lecture-discussions. Prerequisite: PLS 201 or AMC and PLS 314 or MHR 301.

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 government operations. Emphasis on the development, approval, and management of the expenditure budget. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201 and PLS 314 or MHR 301.

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. Prerequisite: PLS 201 or AMC 201 and PLS 314 or MHR 301.

PLS 426 American Political Culture and Behavior (4)

Attitudes, values, beliefs, and behavior patterns characteristic of the American public. Patterns and sources of differences and divisions within this context. Seminar, 4 hours. Prerequisite: PLS 201 or AMC 201.

PLS 427 American Political Economy (4)

Examination of the relationship between politics and macroeconomic policymaking in the United States, special attention to the impact of economic policymaking on the political behavior or mass publics. Theories of political economy, the structure of the political economy, and the relationships between political and economic systems. Seminar, 4 hours. 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. Emphasis on the timeliness of classical and medievel political conceptions. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 432 Modern Political Thought (4)

From Machiavelli 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 life. Seminar, 4 hours. 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 438 Psychology of Politics (4)

Political factors involved in human behavior, including voting, public opinion, socialization, consciousness, authority, belief systems, alienation, and motivation. Seminar, 4 hours. Prerequisite: PLS 201 or AMC 201.

PLS 439 Political Inquiry Colloquium (4)

Inquiry into selected topics of contemporary political thought. May be repeated with total credit limited to 8 units. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201, or permission of instructor.

PLS 441 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 442 Sub-Saharan African Governments and Politics (4)

Political behavior and processes of governments in Sub-Saharan Africa, emphasis on governmental policies, distribution of goods, services, and power; effects of colonialism, neo-colonialism, political conflict and integration; the international system as it impinges on these countries. 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 Latin American Governments and Politics (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 trends in Cuba, Brazil, Mexico, Chile, and Argentina. Seminar, 4 hours. Prerequisite: PLS 201 or AMC 201.

PLS 445 Asian Governments and Politics (4)

Comparative analysis of political institutions and processes in major Northeast Asian (Japan, China, Korea) and Southeast Asian (Vietnam, Thailand, Malaysia, Indonesia, Singapore, Philippines) states, with emphasis on their interrelationships and national efforts to meet challenges of modernization, communications, and security. 4 lecture-discussions. Prerequisite: PLS 201 or AMC 201.

PLS 446 Middle Eastern Governments and Politics (4)

Contemporary government and politics of the Middle East. Emphasis on the historical, cultural, and economic dynamics of the region. An extensive analysis of the dominant states in the area and their interaction regionally and internationally. 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, particularly 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 U.S.-Latin 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. Seminar, 4 hours. Prerequisite: PLS 201 or AMC 201.

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. Seminar, 4 hours. 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)

In-depth inquiry into selected topics in one of the sub-areas of the discipline. Seminars in two political science sub-areas required for completion of the major. May be repeated twice 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 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.

PSYCHOLOGY

One of the three majors offered in the Behavioral Sciences Department is *Psychology*. For other programs in this department, see Sociology and Behavioral Sciences.

Nancy J. Harkey, *Chair*

Sonia L. Blackman
Wayne C. Brown
Gary A. Cretser
Larry Goldman
Barbara K. Goza
Louis J. King
William R. Larson
Marcia E. Lasswell
Joseph J. Leon
Frederick B. Meeker
David G. Null
Fernando Parra
Joseph L. Phillbrick
Donald V. Shupe
Susan N. Siaw
Felicia F. Thomas
Wayne S. Wooden

The Psychology degree program, which is housed in the Department of Behavioral Sciences, is designed to provide a comprehensive undergraduate education in this field, leading to the Bachelor of Arts degree. The student will receive a broad exposure to developmental, social, cognitive, clinical and physiological areas of Psychology, as well as specific training in research methodology and statistics. Original student research is also fostered and encouraged during the undergraduate experience. The program is intended primarily as an excellent foundation for entrance to graduate school in any area of psychology, but also provides a good background in the science of human behavior for students seeking careers in management in public and private sectors, or seeking an undergraduate major in this area for a variety of other reasons.

For this major, the high school student should have a broad background in the natural and social sciences, English and mathematics.

The department also offers minors in Psychology, Sociology, and Criminal Justice and Corrections. The Psychology and Sociology minors are not open to students with majors in Behavioral Sciences, Psychology or Sociology, but the Criminal Justice and Corrections minor may be taken by students in any of these majors.

The department also offers a minor and certificate program in Criminal Justice and Corrections. This 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. The courses required in this program are listed under the Behavioral Sciences major. 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 department office.

Since Behavioral Sciences is an interdisciplinary major drawn from Psychology and Sociology, students may not double major in Psychology and Behavioral Sciences. The minor in Criminal Justice and Corrections, however, *may* be taken by Psychology majors.

PHYSIOLOGY MINOR

The Physiology Minor is an interdisciplinary program which can be elected by students majoring in any field. Its purpose is to improve the training and advising of students in order to facilitate their pursuit of careers in biomedical fields utilizing a knowledge of Physiology. It is particularly appropriate for students majoring in Psychology.

A full description of the minor is located in the "University Programs" section of this catalog.

CORE COURSES FOR MAJOR *

Meth Behavioral Sciences	BHS	204	(4)
Meth Behavioral Sciences	BHS	205	(4)
Principles of Psychology	PSY	202	(4)
Principles of Psychology	PSY	203	(4)
Principles of Sociology (SOC 201 under G.E.)	SOC	202	(4)
Stat for Behav Science	BHS	307	(4)
Social Psychology	PSY	401	(4)
History and Systems	PSY	410	(4)
Experimental Psychology	PSY	433	(5)
Senior Project	BHS	461/462	(4)
OR Senior Seminar	BHS	498	

Choose one from *each* group below:

A. PSY 303, PSY 334, PSY 402, PSY 460 (4-5)
B. PSY 403, PSY 412, PSY 415, SOC 430, PSY 430 (4)
C. PSY 416, SOC 433, BHS 426 (4-5)
D. PSY 305, PSY 310, PSY 312, SOC 425 (4)
E. PSY 314, PSY 321, PSY 450, PSY 455, PSY 517 (4)

Approved electives in PSY, SOC, BHS, (300-400 level, not to include 400 or 499) chosen in consultation with advisor (12)

SUPPORT AND ELECTIVE COURSES

Freshman English I	ENG	104	(4)
Logic and Semantics	PHL	202	(4)
Public Speaking	COM	100	(4)
Principles of Soc	SOC	201	(4)
Writing for the Profession	ENG	301	(4)
Intro Cult Anthro	ANT	102	(4)

Approved electives (300-400 level) chosen in consultation with advisor (12)
Courses to complete G.E. requirements (52)
Unrestricted electives (22)

PSYCHOLOGY MINOR

(May not be taken by majors in Psychology, Sociology, or Behavioral Sciences)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Required of all students in the minor:

PSY 202	Principals of Psychology I	4
PSY 203	Principals of Psychology II	4
		8

Choose four courses from one of the following tracks:

I. Counseling

PSY 314	Human Relations	4
PSY 403	Psychology of Personality	4
PSY 412	Theories of Counseling	4
PSY 415	Abnormal Psychology	4
PSY 416	Psychological Testing	4
PSY 417	Basic Counseling	4
PSY 418	Intro to Group Counseling	4
PSY 450	Principles of Behavioral Management	4

II. Industrial/Organizational

PSY 314	Human Relations	4
PSY 332	Industrial & Personnel Psychology	4
PSY 416	Psychological Testing	5
PSY 417	Basic Counseling	4
PSY 418	Intro to Group Counseling	4
PSY 420	Environmental Psychology	4
BHS 426	Applied Social Psychology/Sociology	4
SOC 433	Survey Research	4

III. General

PSY 305	Basic Developmental Psychology	4
PSY 321	Psychology of Identity	4
PSY 334	Cognitive Processes	4
PSY 401	Social Psychology	4
PSY 402	Theories of Learning	4
PSY 410	History and Systems	4
Total units in track		12–14

Two additional upper division courses chosen from Behavioral Sciences, Psychology, or Sociology. The current list of available courses is:

BHS 307	Statistics for Behavioral Sciences	4
BHS 328	Women and Men: Changing Sex Roles	4
BHS 340	Computer Methods in Behavioral Science	4
BHS 400	Special Problems for Upper Division Students	4
BHS 463	Undergraduate Seminar	2
BHS 499	Special Topics for Upper Division Students	1–4
PSY 303	Physiological psychology	5
PSY 310	Child Psychology: Early Childhood	4
PSY 311	Child Psychology: The Middle Years	4
PSY 312	Adolescent Psychology	4
PSY 340	Educational Psychology	4
PSY 430	Psychobiology of Mental Disorders	4
PSY 455	Human Sexual Behavior: Relationships	4
PSY 460	Sensations and Perception	4
PSY 517	Clinical Psychology	4
PSY 550	Special Topics in Psychology	1–4
Total units required for minor:		24–32

Course Descriptions

PSY 110-HE 110 Foundations in Early Childhood Education (4)

Fundamental principles of child growth and development as they have influenced the development of the field of early childhood education. Trends and issues in child growth and development and early childhood education concerning the child in the family and community. 2 lecture-discussion, two 2-hour arranged activities involving participation in local children's centers.

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. May be taken for Credit/No Credit by non-majors.

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 210 Mind, Brain and Behavior: An Integrated View (4)

Philosophical/biological exploration of the relationship of human behavior/mind/consciousness and the brain. Includes environmental effects on development; human sexuality and sex differences; learning and memory; pain, psychoactive drugs; normal and abnormal aging; and the brain and mental disorders. 4 lecture-discussions.

PSY 303 Physiological Psychology (5)

Relationship of genetic, anatomical and physiological factors to the behavior of organisms; intensive student exploration of the relevance of biological mechanisms to an understanding of human behavior. Introduction to research techniques in physiological laboratory. 4 lecture problem-solving, one 3-hour laboratory. Prerequisites: BIO 110 or BIO 115 or PSY 210 and one from PSY 201, PSY 202, or PSY 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. Emphasis on factors that facilitate/impede development; early learning and the development of language; growing awareness of self; cross-cultural comparisons of development. 4 lecture-discussions. Prerequisite: PSY 201 or 202.

PSY 311 Child Psychology: The Middle Years (4)

Developmental aspects of the physical, cognitive, social, emotional growth of the child from kindergarten years through preadolescence. Emphasis on development of social abilities, and social awareness; thought processes; awareness of self in relation to environment. Cross-cultural aspects of development and socialization. 4 lecture-discussions. Prerequisites: PSY 310 or permission of instructor.

PSY 312 Adolescent Psychology (4)

Physical, social, emotional, and intellectual growth of adolescents. Emphasis on personality formation, social adjustments, and problems of self-identity. Cross-cultural aspects of adolescent development. 4 lecture-discussions. Prerequisite: PSY 201 or 202.

PSY 314 Human Relations (4)

Human relation problems in contemporary American organizations. Lectures and counseling involvements related to increasing the student's ability to both lead and participate in small group relationships. 3 lecture-problem solving, 1 two-hour activity. Prerequisite: upper division standing.

PSY 321 The Psychology of Identity (4)

An intensive examination of self in terms of theory, locus, development outcomes, sex identity, group identity, and the self in relation to others, extensive in-class practice in techniques for self-awareness, self-evaluation, self-disclosure, self-assertion. 4 lecture-problem solving. Prerequisities: PSY 201 or 203 and upper division standing or permission of instructor.

PSY 332 Industrial and Personnel Psychology (4)

Survey of the applications of Psychology to the selection and motivation of employees, leadership, person-machine systems, work, efficiency, and morale; additional areas of concentration are gender, ethnicity, and culture. 4 lecture-discussion. Prerequisite: PSY 201 or PSY 202 or PSY 203 or equivalent course.

PSY 334 Cognitive Processes (4)

Processes by which humans acquire and maintain knowledge. Focus on the relationships of perception, language, and concept attainment. Major theories of cognition. Gender and culture differences in cognition. Classroom experience with various perceptual and cognitive tasks. Four lecture-problem solving. Prerequisite: PSY 201 or 202.

PSY 340 Educational Psychology (4)

Psychological principles of the learning process: an analysis of the teaching-learning situation with emphasis on the cognitive basis of learning and instruction. 4 lecture-discussions. 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 and research. Status and form of contemporary theory. 4 lecture-discussions. 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 (4)

Seminar in theories and systems of contemporary psychology. Examination of historical origins of modern theories. Student participation in evaluation of competing theories and generation of new models. 4 seminar-discussions. 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 is on an integrated analysis from a psycho-social viewpoint. 4 lecture-discussions. Prerequisite: PSY 201 or 202.

PSY 416 Psychological Testing (5)

Introduction to construction, standardization and statistics involved in both objective and projective testing, in such areas as aptitude, achievement, vocational preference, motivation, and personality. Clinical practice in administering, scoring and interpreting selected tests and measures. 4 lecture-problem solving, one 3-hour lab. Prerequisites: PSY 202, 203 and upper division standing.

PSY 417 Basic Counseling (4)

An introductory investigation of the dynamics involved in the one-to-one relationship. Emphasis on social communication, basic counseling, and interviewing techniques.To be implemented by small group involvement and individual student supervision. 3 lecture-problem solving, 1 two-hour activity. Prerequisite: PSY 314.

PSY 418 Introduction to Group Counseling (2)

Study and experimentation in techniques aimed at facilitating introspection and self-analysis through group processes. 2 one-hour clinics. Prerequisites: PSY 314, 417.

PSY 420 Environmental Psychology (4)

Physical and social contexts of person-environment transaction. Cross-cultural variables in environmental determinants of behavior: environmental assessment. Small group-large group ecologies; environmental design: Future environments. 4 lecture-discussions. Prerequisites: PSY 201 or 202 and upper division standing, or permission of instructor.

PSY 430 Psychobiology of Mental Disorders (4)

A psychobiological examination of the etiology, demographic distribution, and treatment of mental disorders, including the psychoses, effects of brain damage, disorders of aging, and other selected topics. Overview of neurological and neuropsychological assessment techniques. 4 seminar-discussions. Prerequisites: PSY 201, 202 or 203 or equivalent, BIO 110 or 115 or PSY 210 or equivalent.

PSY 433 Experimental Psychology: Research Methodology and Design (5)

Research method and design in contemporary experimental psychology. Univariate/multivariate design. Statistical and experimental control techniques. Prediction, hypothesis testing, evaluation of results. Research ethics. Critique of sampling designs. Evaluation of current literature. 4 lecture-problem solving, one 3-hour laboratory. Prerequisites: BHS 204, PSY 202, PSY 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. 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. Examination of ethnic, socioeconomic, cross-cultural differences. Four lecture-discussions. Prerequisites: BIO 301 or permission of instructor.

PSY 460 Sensation and Perception (4)

Methods of perceptual assessment, quantification and analysis. Classical and contemporary psychophysics, methods of scaling subjective magnitude. Activities include data collection, analysis and written reports.-Prerequisites: PSY 202, 203 and BHS 204 and 205. 3 lecture-problems, 1 two-hour activity.

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.

PSY 550 Special Topics in Psychology (1-4)

Review of selected topics in psychology, 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.

For courses in Behavioral Sciences and in Sociology please refer to the appropriate sections in this catalog.

RECREATION ADMINISTRATION

One of the two majors offered in the Department of Health, Physical Education, and Recreation is recreation administration. For the other program offered in the department, see physical education.

Bruce Coulter, *Chair*

Robert E. Pfister, *Coordinator*

Aubrey Fine Barbara Ford Sam Lollar
Gus Gerson, Jr.

The recreation major offers a 4-year curriculum leading to the Bachelor of Science in Recreation Administration with option areas in (1) therapeutic recreation, (2) management, and (3) outdoor recreation. Study in these areas is intended to equip the student for professional-level entry into a variety of 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, or consultants.

The core curriculum, emphasizing preparation for professional leadership in the management of leisure activities, combines theory with practice 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)

Recreation Skills Practicum	REC	101	(3)
Intro to Outdoor Recreation	REC	111	(3)
Intro to Therapeutic Rec	REC	121	(4)
Introduction to Public Recreation	REC	131	(3)
History, Phil & Theory of Rec	REC	141	(4)
Rec. Leadership & Grp. Dyn.	REC	301	(4)
Introduction to Commercial Recreation	REC	231	(3)
Compet. & Coop. Act.	REC	241	(4)
Comm Rel in Rec	REC	340	(4)
Programming Mgmt & Procedures	REC	341	(4)
Leisure Guidance: Counseling & Education	REC	425	(3)
Organiz. & Mgmt I	REC	443	(4)
Organiz. & Mgmt II	REC	444	(4)
Career Search in Recreation	REC	445	(3)

PLUS

Internship (or Coop Ed) full-time intern.	REC	465	(16)

OPTIONS*

Additional courses in choice of one of three options areas (14-16)

Outdoor Core Courses:

Org/Adm of Camping	REC	315	(4)
Outdoor Education	REC	318	(4)
Wilderness Leadership	REC	316	(3)
Trends/Prob Rec	REC	442	(4)

Management Core Courses:

Organ. & Admin. of Camping	REC	315	(4)
Rec. in Urb. Settings	REC	330	(4)
Fundraising Techn.	REC	440	(4)
Tr. & Prob. in Rec.	REC	442	(4)

Therapeutic Courses:

Leisure and Aging	REC	326	(4)
TR: Psych & Correc.	REC	423	(4)
Ther. Rec for Phys/disabled & Ment. Ret.	REC	424	(4)
T. R. Fieldwork	REC	426	(4)

SUPPORT COURSES

Outdoor:

First Aid	PE	205	(3)
Creativity	ME	320	(3)
Campcrafter Skills	REC	218	(3)
Outdoor Survival	REC	418	(3)
Rec. in Urb. Settings	REC	330	(4)
Youth & Voluntary Agencies	REC	441	(3)

Management:

Students are required to take one of three specialization areas three specialization areas are: a) community services agency; b) commercial agency; c) industrial agency. See advisor for unit totals.

Therapeutic Recreation:

Procedures & Techniques in TR	REC	322	(4)
Human Anatomy	ZOO	234	(4)
Adaptive PE	PE	206	(3)
Abnormal Psych	PSY	415	(4)
Kinesiology	PE	302	(4)
Leisure Guid	REC	425	(4)

DIRECTED ELECTIVES

SEE ADVISOR

GENERAL EDUCATION:

Category I—12 units

Required of all:

Freshman English I	ENG	104	(4)
Logic and Semantics	PHL	202	(4)
Public Speaking	COM	100	(4)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Category II—16 units

Required of all: A) STA 120
B) GEO 101
C) BIO 110, 111
D) BIO 201, 213, 220, GSC 250

Category III—12 units

Required of all: A) MU 100 or DAN 202
C) ENG 205, 215, 216, 231, *or* Foreign Language

Outdoor: B) PHL 201 *or* 205

Management: B) PHL 201 *or* 204

Therapeutic: B) PHL 201 *or* 204

Category IV—12 units

Outdoor: A) EC 202
B) EWS 140 or GEO 102
C) ENV 113

Management: A) MKT 201
B) Category VII course
C) PLS 202 *or* HST 201

Therapeutic: A) EC 201 *or* SSC 101
B) Category VII course
C) PLS 202 *or* HST 201

Category V—4 units

Choose one of CPU 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—4 units to count in IVB) In therapeutics, 4 units to count in Category III or IV. See advisor for approved packages.

UNRESTRICTED ELECTIVES:

OUTDOOR (7)
MANAGEMENT (Varies)
THERAPEUTIC (7)

MINOR IN RECREATION ADMINISTRATION

Courses in Minor

Rec Ldrshp & Group Dyn	REC	301	(4)
History, Theory, Philosophy	REC	141	(4)
Community Relations	REC	340	(3)
Programming Mgmt. Procedures	REC	341	(4)
Leisure Guidance: Counseling & Education	REC	425	(3)
*PLUS a minimum of 18 units (with the approval of recreation minor advisor)** from following list (minimum one upper division course)*			(18)
Recreational Skills Practicum	REC	101	(3)
Introduction to Outdoor Recreation	REC	111	(3)
Intro to Therapeutic Recreation	REC	121	(4)
Leisure in Society	REC	125	(4)
Recreational Games/Sports	REC	132	(3)
Campcrafter Skills	REC	218	(4)
Intro to Commercial Rec.	REC	231	(3)
Organization & Administration of Camping	REC	315	(4)
Wilderness Leadership	REC	316	(4)
Urban Recreation	REC	330	(4)
Outdoor Survival	REC	418	(3)
Psychiatric and Corrections	REC	423	(4)
Rec for Phys Disabled & Ment Ret	REC	424	(4)
Fund Raising Techniques	REC	440	(4)
Trends & Problems in Recreation	REC	442	(4)
Organiz. & Mgmt I	REC	443	(4)
Organiz. & Mgmt II	REC	444	(4)
Total units required			(35)

** These 18 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 101 Recreation Skills Practicum (3)

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, 2 hours activity. Prerequisite: permission of instructor.

REC 111 Introduction to Outdoor Recreation (3)

Introduction to and participation in a variety of outdoor programs aimed at enhancing the student's knowledge and appreciation of the outdoors. 2 lectures, 2 hours activity.

REC 121 Introduction to Therapeutic Recreation (4)

Examination of therapeutic recreation services. Topics include: understanding the basic concepts of recreation's role in rehabilitation; philosophy and terminology; etiology of various disabling conditions; appropriate strategies to develop effective programs. Students examine cases and propose solutions; field trips. 3 lecture/problem solving, 2 hours educational workshop.

REC 124 The Philosophy of Leisure & the Work Ethic (4)

An exploration of leisure and the work ethic from a philosophical perspective. Art and aesthetics are examined in the context of leisure. 4 lectures.

REC 125 Leisure in Society (4)

An exploration of leisure from a sociological, political, historical and economic perspective. Analysis of social institutions and their effects on the development of leisure and popular culture in post-industrial societies. 4 hours lectures.

REC 131 Introduction to Public Recreation (3)

Organization of recreation programs delivered through the public sector. Overview of the legislative process at the local, state, and federal levels and its impact upon leisure services; interrelationships of agencies; career opportunities; observations of community recreation systems; case study format. 3 hours lecture/problem solving.

REC 132 Recreational Games and Sports (3)

Problem solving theory and techniques of leadership for games/sports common to recreation. Emphasis on: identification of needs, interests, and abilities of age groups; practical games leadership. Individual evaluation and feedback using video-tape replays to identify problems. 2 hours lecture/problem solving, 2 hours activity.

REC 141 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 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 and Map Reading (3)

Basic understanding of maps and compass. Actual experience traveling utilizing maps and compass, including hiking and long distance running. Two hours lecture/problem solving, one three-hour laboratory.

REC 218 Campcrafter Skills (3)

Small group and individual instruction of outdoor skills necessary for leaders of youth camping programs. Analysis of: camping leadership skills; camp program planning; outdoor campcrafter skills. Provides basis for American Camping Association certification programs. Group reports; small group leadership critiques. Two hours lecture/-problem solving, three hours laboratory.

REC 231 Introduction to Commercial Recreation (3)

Introduction to the scope and extent of recreation-related business field and to management concerns unique to this aspect of parks and recreation services. 3 lectures.

REC 241 Competitive and Cooperative Activities (4)

The selection and conduct of activities as a means of goal attainment; evaluation of leadership techniques appropriate for each level; pre-school through senior citizens; in the areas of dance, drama, music, arts and crafts, games, sports and special events. 2 hours lecture/2 hours activity to be arranged/2 hours activity scheduled.

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 301 Recreation Leadership & Group Dynamics (4)

Theory and experience necessary to develop an understanding of group dynamics and effective group skills as they relate to leadership in leisure service settings. Experiential approach is used to analyze group effectiveness and to develop competent group skills. 4 hours lecture/problem solving. Prerequisite: Permission of instructor.

REC 315 Organization and Administration of Camping (4)

Methods, objectives, and problem solving dealing with the organization and administration of resident camps, school camps, day camps, and travel camps. Focus on camp staffing, financing, marketing, and programming. Application of American Camping Association standards to practical camping situations. Prerequisites: REC 111, 141, 301, or permission of instructor. 3 hours lecture/problem solving, 3 hours laboratory.

REC 316 Wilderness Leadership (3)

Effective techniques of recreational program leadership in a wilderness setting. Through field trips and in-class exercises each student will develop and present individual and group projects. Prerequisites: REC 111 or permission of instructor. 2 lecture/problem solving, one 3-hour laboratory.

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 321 Interventive Strategies and Special Populations (4)

An examination of interventive strategies, specialized techniques and alternatives made available to special populations. An analysis of approaches utilized with specific disabling conditions will be incorporated. 4 lecture/problem solving.

REC 322 Procedures and Techniques in Therapeutic Recreation (4)

Analysis of therapeutic recreation procedures. Professional elements comprising therapeutic recreation service, program models, organizational skills, facilitation techniques, and diagnostic and assessment procedures. Prerequisites: REC 121 or permission of instructor. 4 clinical/lectures.

REC/SW 324 Disabled Populations (4)

Development of sensitivity to and an understanding of special problems encountered by people who are disabled. Verbal and written presentations on topics such as employment, architectural barriers, legal aspects, technological developments, and impact on society. 4 lecture/problem solving.

REC 326 Leisure and Aging (3)

Understanding and evaluating the leisure needs of the older adult. Students are sensitized to the biological, psychological and sociological changes that occur in aging. Focus on various intervention strategies related to enhancing the later years. Legislation relating to aging is surveyed. Prerequisites: REC 121, REC 322, or permission of instructor. 3 clinical/lecture.

REC 330 Recreation in Urban Settings (4)

Cultural and ethnic diversity of urban environments as related to the delivery of parks and recreational opportunities. Students are required to participate in field trips, to analyze problems, and to present papers. Prerequisites: REC 131, 141, or permission of instructor. 3 lecture/problem solving, one 2-hour activity.

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. Prerequisite: REC 301 or permission of instructor.

REC 341 Programming Management and Procedures (4)

Management of programming processes in recreation settings; goals, objectives, needs assessment, activity analysis, direct-cost budgeting, staff and program evaluation. Practical experience through simulated case studies concluding in formal written and oral presentations to actual recreation governing body. Prerequisites: REC 141, 301, 400 hours of field experience, and permission of instructor. 2 lecture/presentations, two 2-hour activities.

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 417 Law Enforcement in Recreation and Parks (2)

Comprehensive look at law enforcement in the regional, state, national parks and wildland recreation areas: 2 lectures. Prerequisites: REC 111 or consent of instructor.

REC 418 (MS 418) Outdoor Survival (3)

Students develop outdoor survival skills through problem solving. Areas covered include: shelters and campsite selection; orienteering and travel; identification and procurement of food and water; survival attitudes. Thirty hour field situation includes practicing and testing acquired skills. May be repeated twice for credit (once for desert survival and once for alpine/arctic setting). 2 hours lecture/problem solving, one 3-hour laboratory.

REC 423 Therapeutic Recreation: Psychiatric and Correctional (4)

Clinical procedures as well as programming methods used in psychiatric and correctional settings; interdisciplinary roles and relationships; training in charting and group processes. Volunteer field experience in an approved therapeutic setting. The recreation therapist as a mental health professional. Prerequisites: REC 121, REC 322 or permission of instructor. 3 clinical/lecture, 2 hours activity.

REC 424 Therapeutic Recreation for the Physically Disabled and Mentally 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 clinical lectures, 2 hours educational workshop.

REC 425 Leisure Guidance: Counseling and Education (3)

Development of counseling skills and educational techniques that can be utilized in leisure guidance, as well as the use of assessment tools to assist people in determining their leisure needs, potentials, and resources. Prerequisites: REC 121, 141, or permission of instructor. 2 clinical/lectures, one 2-hour educational workshop.

REC 426 Therapeutic Recreation Fieldwork (4)

Fieldwork in therapeutic recreation. Supervised clinical experience in selected community sites for the disabled and within Cal Poly's Therapeutic Recreation Lab. May be repeated once for credit. Two-hour lecture/two 2-hour activities. Prerequisites: junior/senior standing—therapeutic recreation emphasis candidate, REC 121, REC 424, or permission of instructor.

REC 440 Successful Fund Raising Techniques (4)

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. 2 lectures, 2 two-hour activities. Prerequisite: REC 340 or consent of instructor.

REC 441 Youth and Voluntary Agencies (3)

An analysis of the functioning and management of youth and voluntary organizations actively involved in the provision of recreation and leisure services. Students contact organizations to identify problems such as goal definition, public relations, fiscal and volunteer management. Prerequisites: REC 111, REC 131 or permission of instructor. 2 lecture/problem solving, one 2-hour activity.

REC 442 Trends and Problems in Recreation (4)

Contemporary topics in recreation and analysis of issues, programs and problems pertaining to the delivery of recreation services. May be repeated once for credit. 3 lecture/problem solving, 2-hour activity. Prerequisite: REC 341.

REC 443 Organization and Management I (4)

Concepts and theories of managment and the organization of leisure delivery systems as the first of a two-part course. Part I explores recreation organizations, management theory, staffing, planning, promotion and management problem solving. Prerequisites: REC 121, 131, 141, 341 or permission of instructor. 4 lecture/discussions.

REC 444 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. 3 lecture, 2 hours activity. Prerequisites: REC 443 or concurrent enrollment.

REC 445 Career Search in Recreation (3)

Seminar in techniques of the job search in recreation including capstone experience, intensive student/faculty interaction, and development of professional file. Activity includes practice before an oral interview board, videotaping of interviews, and critique. Prerequisites: Senior standing and permission of instructor. 2 hours seminar/discussion, one 2-hour activity.

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 Upper Division Special Topics Seminar (4)

Critical and analytical examination by students of a selected topic, the title to be specified in advance. Total credit limited to 8 units with a maximum 4 units per quarter. Substantial student presentations required. Prerequisite: junior or senior standing with considerable recreation course work and permission of instructor. 4 seminar/discussion.

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.

David G. Lord, *Chair*

David M. Adams
Judith I. Anderson
Kane C. Anyanwu
Joseph P. Beaton
Thomas C. Blackburn
Walter P. Coombs
George E. Derfer
Richard S. Hyslop
Richard L. Johnson
Sheila G. McCoy
James C. Manley
Crane S. Miller
John A. Moore Jr.
Richard C. Richards
Laurie J. Shrage
Joseph A. Tiffany
Harold F. Turnbull
Dorothy D. Wills

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.

TEACHER PREPARATION—SINGLE SUBJECT CREDENTIAL

Students desiring a Social Science waiver for the single subject credential must fulfill all of the requirements for a Social Science degree.

CORE COURSES FOR MAJOR*

(Required of all students)

Introduction to Physical Anthropology	ANT	101	(4)
Psychological Anthropology	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)
Social Sciences Methodology	SSC	333	(4)

Each student will complete at least 5 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) . . . . . (20)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Freshman English II	ENG	105	(4)
Intro to Ethnic and Women's Studies	EWS	140	(4)
Political Systems	PLS	202	(4)
Principles of Sociology	SOC	201	(4)
Unrestricted Electives			(50)

GENERAL EDUCATION REQUIREMENTS:

Category I: (Pattern 1)

Freshman English I	ENG	104	(4)
Public Speaking	COM	100	(4)
Logic and Semantics	PHL	202	(4)

Category II:

A. Select one course . . . . . (4)
B. Select one course . . . . . (4)
C. Select one course . . . . . (4)
D. Select one course . . . . . (4)

Category III:

A. Select one course . . . . . (4)
B. Intro. to Philosophy . . . . . PHL 201 (4)
C. Select one course . . . . . (4)

Category IV:

A. Principles of Economics	EC	202	(4)
B. Intro. to Cult. Anthropology	ANT	102	(4)
C. Hist of Civ.: The Modern WLD	HST	103	(4)

Category V:

Select one course . . . . . (4)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Category VI:
Group 1:
American Civilization..... AMC 201 (4)
Group 2:
American Civilization..... AMC 202 (4)

Category VII:
12 upper division units are required from a Theme or Depth package, 4 of which may replace lower division units in Categories II or III. See Advisor.....(8)
Total Units Required for Degree .....(198)

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 techniques 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)

Practicum in contemporary social science methods and techniques, including library research, field work, interviewing, questionnaires, models, quantification and computer analysis, cartography, remote sensing, and experimentation. 3 lectures/problem solving, 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: NMUN Preparation (4)

Seminar for National Model U.N. Interdisciplinary analysis of peace; inter-group conflict and resolution; and peace institutions, particularly United Nations and related agencies. Simulations of conflict resolution. Uses concepts and methodologies of several social sciences. 4 seminar/discussion. Prerequisites: Selection for NMUN and approval of instructor. May be repeated for credit.

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

Charles H. Frost, *Chair*
Consuelo G. Lopez
Victor E. Coppin

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 systems. 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 411, Introduction to Field Work, SW 412 and 413 (taken concurrently), Social Work Practice and SW 414 and 415 (taken concurrently), is by written application and interview only. Application forms are available in the department office and must be filed there by May 1. (SW 410, please see advisor for application.)

CORE COURSES IN MAJOR *

(Required of all students)

Introduction to Social Welfare	SW	201	(4)
The Life Cycle I	SW	220	(4)
The Life Cycle II	SW	221	(4)
Social Work Practice I	SW	300	(4)
Social Work Practice II	SW	301	(4)
Social Work Practice III	SW	302	(4)
Intro to Field Prac	SW	410	(2)
Intro to Fieldwork	SW	411	(4)
Social Work Practice Seminar I	SW	412	(2)
Field Practicum I	SW	413	(2)
Social Work Practice Seminar II	SW	414	(2)
Field Practicum II	SW	415	(4)
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 3)

Human Serv/Health	SW	303	(4)
Holistic Health	SW	311	(4)
Developmentally Disabled Population	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)
Family Violence	SW	322	(4)
Death and Dying	SW	480	(4)

SUPPORT COURSES

(Required of all students)

Intro. to Cultural Anthropology	ANT	102	(4)
Principles of Economics	EC	202	(4)
Principles of Sociology	SOC	201	(4)
Abnormal Psychology	PSY	415	(4)

Select 2 Courses From List Below

Economics of Social Welfare	EC	437	(4)
Public Administration	PLS	314	(4)
Political Parties & Interest Groups	PLS	324	(4)
Industrial & Personnel Psychology	PSY	332	(4)
Int Strat & Special Populations	REC	321	(4)
Disabled Populations	REC	324	(4)
Principles of Sociology	SOC	202	(4)
Social Problems	SOC	301	(4)
Urban Sociology	SOC	401	(4)
General Education-courses †			(72)
Free Electives			(24)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

† To be selected in consultation with advisor.

Course Descriptions

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)

Historical overview of social welfare as an institutional response to social needs. Major focus is on analysis of social problems and society's responses within the context of current economic and political policy. Evaluation of current trends and future possibilities. 4 lecture/discussion.

SW 220 The Life Cycle I (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. Analysis of case studies associated with each stage and related social services. 4 lecture/problem solvings. Prerequisites: BIO 110 and 111.

SW 221 The Life Cycle II (4)

Physical, psychological, social, cultural factors of development in young adulthood, middle age and old age. Analysis of case studies associated with each stage and related social services. 4 lecture/problem solving. Prerequisites: SW 220, The Life Cycle I.

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 Work Practice I (4)

Introduction to generalist model of social work practice. Theoretical foundations for and value base of professional practice. Problem solving process, the nature of assessment and helping skills, client and worker roles and human diversity. 4 lecture/problem solving. Prerequisites: SW 201.

SW 301 Social Work Practice II (4)

Examination of assessment, intervention, evaluation and termination phases of the problem solving method through case analysis, application of knowledge of social systems, human development, and diversity in implementation of the method. Acquisition of skills in communication, interviewing and group process. 4 lecture/problem solving. Prerequisites: SW 201 and SW 300.

SW 302 Social Work Practice III (4)

Application of the generalist problem-solving method with special focus on macro systems affecting diverse populations. Case analysis and critique. Acquisition of advanced knowledge and skill in assessment, intervention, evaluation and termination. 4 lecture/problem solving. Prerequisites: SW 220, SW 221, SW 300, & SW 301.

SW 303 Human Services in Health Settings (4)

A multidisciplinary examination of the rapid development of specialized health care and human services for children and adults. Problem solving and analysis of case studies, focus on psycho-social, cultural, religious, government influences in the delivery of health care. 4 lecture/problem solving.

SW 311 Holistic Health (4)

An introduction to concepts, attitudes and beliefs of the holistic health movement. Problem solving and analysis of case histories to examine and compare traditional and holistic health services. 4 lecture/problem solving.

SW 312 The Developmentally Disabled Population (4)

Introductory course on disabilities such as mental retardation, cerebral palsy, autism and epilepsy that originate before an individual attains age eighteen. Presents an overview of the categories of the developmentally disabled. Extensive case analysis and problem solving. 4 lecture/problem solving.

SW 313 Child, Youth and Family Crisis (4)

Analysis of the family as a social system. Assessment of dysfunction resulting from the interaction of parent-child, sibling, and marital pair. Problem solving and case analysis methods for treating distorted family roles and breakdown in family communication. 4 lecture/problem solving. Prerequisites SW 201, SW 220 or SW 221 or permission of instructor.

SW 314 The Socially and Culturally Different Child (4)

The dynamics of growth of children from different social, ethnic and cultural experiences. Includes the child handicapped as a result of deprivations. Case analysis and problem solving methods. 4 lecture/problem solving. Prerequisites SW 201, SW 200, or SW 221 or permission of instructor.

SW 318 Contemporary Treatment of Law Violators (4)

Introduction and review of the complex problems posed by the criminal justice field-corrections historical and present public and private efforts to modify the behavior of the law violator will be reviewed and evaluated through the analysis of case histories. 4 lecture/problem solving.

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 322 Family Violence (4)

An introduction to the study of domestic violence and its manifestations in the family. Focus on problem solving needs of practitioners and educators in identification, referral, case management and treatment of victims and perpetrators. 4 lecture/problem solving.

SW/REC 324 Disabled Populations (4)

Development of sensitivity to and an understanding of special problems encountered by people who are disabled. Verbal and written presentations on topics such as employment, architectural barriers, legal aspects, technological developments, and impact on society. 4 lecture/problem solving.

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 410 Introduction to Field Practicum (2)

Supervised field experience in approved social service organizations. 80 hours required to be arranged with Coordinator of Field Instruction. Must be taken prior to or during enrollment in SW 411.

SW 411 Introduction to Field Work (4)

Intensive student preparation for entry into field program. Social Work methodology is reviewed and students apply theoretical practice knowledge to individual, family and community problem situations. Examination of characteristics of social welfare agency settings and the role of professional social workers. Seminar/discussion. Prerequisite: SW 201, SW 300, SW 301. Admission by prior application.

SW 412 Social Work Integrative Seminar I (2)

Integration of theory and practice, assessment of client/systems from a generalist perspective and identification of social work values and dilemmas. Application of the problem solving method; nature of helping skills, client-/worker roles and their relationship to human diversity. To be taken concurrently with SW 413. 2 seminar/discussion. Prerequisites: SW 201, 220, 221, 300, 301, 302, 410 and 411.

SW 413 Field Practicum I (4)

160 hours of supervised field practicum in a social service organization. Must be taken concurrently with SW 412, and arranged with Coordinator of Field Instruction. Prerequisites: SW 410, SW 411 and permission of instructor.

SW 414 Social Work Integrative Seminar II (2)

Integration of theory and practice. Focus on worker self awareness in the intervention, evaluation and termination phases of the problem solving method. Identification and analysis of the method as it applies to social systems, human development and diversity. To be taken concurrently with SW 415. 2 seminar/discussion. Prerequisites: SW 412 and SW 413.

SW 415 Field Practicum II (4)

160 hours per quarter of supervised field practicum in a social service organization. Must be taken concurrently with SW 414 and arranged with Coordinator of Field Instruction. Prerequisites: SW 412, SW 413 and permission of instructor.

SW 431 Social Welfare Policies and Issues (4)

Seminar to analyze and develop policy at the direct services level of social work practice. Use of a model for developing and using policy. Role of social workers in development of policy skills useful in generalist practice. 4 seminar/discussion. Prerequisites: SW 201, SW 300, SW 301, and SW 302.

SW 461, 462, 463 Seminar in Social Welfare Research I, II, III (2) (2) (2)

Methods of social welfare research applicable to the evaluation of generalist social work practice. Focus on characteristics of single system designs for assessing the outcomes of social work interventions. Development and oral presentation of a single system design. 2 seminar/discussion. Prerequisites: SW 201, SW 220, SW 221, SW 300, SW 301, and SW 302.

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)

Critical and analytical examination by students 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. Substantial student presentations required. 4 seminar-discussions. Prerequisite: permission of instructor.

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.

SOCIOLOGY

One of the three majors offered in the Behavioral Sciences Department is *Sociology*. For other programs in this Department, see Behavioral Sciences and Psychology.

Nancy J. Harkey, *Chair*

Sonia L. Blackman
Wayne C. Brown
Gary A. Creter
Larry Goldman
Barbara K. Goza
Louis J. King
William R. Larson
Marcia E. Lasswell
Joseph J. Leon
Frederick B. Meeker
David G. Null
Fernando Parra
Joseph L. Philbrick
Donald V. Shupe
Susan N. Siaw
Felicia F. Thomas
Wayne S. Wooden

The Sociology major, which is housed in the Department of Behavioral Sciences, is designed to provide a substantial foundation in theoretical, methodological, and content areas of sociology, leading to the Bachelor of Arts degree. In addition to a solid introduction to these content areas, students receive specific training in survey research and statistical analysis, and in the many practical applications of sociological theory. The major is an excellent preparation for graduate study in Sociology, Social Work, or Public Administration, and for professional studies in law or medicine. It also provides a very good background for entry level positions in management, in both public and private sectors.

For this major, the high school student should have a broad background in college preparation courses in natural and social sciences, English, and mathematics.

The department also offers minors in Psychology, Sociology, and Criminal Justice and Corrections. The Psychology and Sociology minors are not open to students with majors in Behavioral Sciences, Psychology or Sociology, but the Criminal Justice and Corrections minor may be taken by students in any of these majors. This 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. Courses required in the minor and certificate program are listed under the Behavioral Sciences major. 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 department office.

Since Behavioral Sciences is an interdisciplinary major drawn from Psychology and Sociology, students may not double major in Sociology and Behavioral Sciences.

The department has a chapter of Alpha Kappa Delta, the National Honor Society in Sociology.

CORE COURSES FOR MAJOR *

Meth Behavioral Sciences	BHS	204	(4)
Meth Behavioral Sciences	BHS	205	(4)
Principles of Sociology	SOC	201	(4)
Principles of Sociology	SOC	202	(4)
Principles of Psychology	PSY	202	(4)
Soc Organization	SOC	310	(4)
Socialization, Self and Society	SOC	402	(4)
Sociological Theory	SOC	405	(4)
Class, Status and Power	SOC	410	(4)
Senior Seminar	BHS	498	(4)

Choose one from Groups A, and B below:

Group A: SOC 320 or SOC 350 ..... (4)
Group B: SOC 321, SOC 401 or SOC 425 ..... (4)

Choose two from Groups C and D

Group C: BHS 307, BHS 340, SOC 433 ..... (8)
Group D: SOC 301, SOC 302, SOC 360, SOC 430 ..... (8)
Approved electives in BHS, PSY, SOC (300–400 level, not to include 400 or 499) chosen in consultation with advisor ..... (12)

SUPPORT AND ELECTIVE COURSES

Intro to Statistics	STA	120	(4)
Freshman English I	ENG	104	(4)
Logic and Semantics	PHL	202	(4)
Public Speaking	COM	100	(4)
Gen. Psychology	PSY	201	(4)
Writing for the Profession	ENG	301	(4)
Intro Cult Anthro	ANT	102	(4)

Approved electives (300–400 level) chosen in consultation with advisor ..... (8)
Courses to complete G.E. Requirements ..... (52)
Unrestricted electives ..... (26)

SOCIOLOGY MINOR

(May not be taken by majors in Psychology, Sociology, or Behavioral Sciences)

Required of all students in the minor:

SOC 201	Principles of Sociology I	4
SOC 202	Principles of Sociology II	4
SOC 301	Contemporary Social Problems	4
SOC 410	Class, Status and Power	4
SOC 433	Survey Research	4

Choose three courses from:

SOC 302	Criminology	4
SOC 310	Social Organization	4
SOC 350	Collective Behavior	4
SOC 360	Juvenile Delinquency	4
SOC 401	Urban Sociology	4
SOC 402	Self and Society	4
PSY 332	Industrial and Personnel Psychology	4
PSY 426	Applied Social Psychology/Sociology	4

Total units required for minor: 32

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Course Descriptions

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. May be taken for Credit/No Credit by non-majors.

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, legal and economic factors relating to marriage and early adjustment. Cross-cultural comparisons of marriage and family life. Preparation for marriage. 4 lecture-discussions.

SOC 290/PLS 290 Political Sociology (4)

Social bases of the political process. Socialization, participation, elite-mass relationships. Influence of factors such as class, race, religion, and sex on political attitudes and behavior. Course listed as both, SOC 290 and PLS 290. Meets General Education requirements in Categories IV B & C for Electrical and Computer Engineering and Industrial and Manufacturing Engineering only. Not open to Political Science or Behavioral Sciences majors. 4 lecture-discussions.

SOC 301 Contemporary Social Problems (4)

Analysis of leading social problems facing America today, including consideration of variations between cultures in the United States and other nations and regions, and variations across historical time in such areas as drugs, crime, family issues, others. 4 lecture-discussions. Prerequisite: Junior standing.

SOC 302 Criminology (4)

Causal theories, nature, extent, control, and prevention of crimes. Differences across cultures with 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. Comparison with such conflicts in other parts of the world. 4 lecture-discussions. Prerequisites: SOC 201 and SOC 202.

SOC 321 Family as a Social Institution (4)

Social and cultural development of the family as a social institution, focusing upon the structures, functions, cultural cross-cultural and historical variation forms of disorganization and analysis of current trends. Four lecture-discussions. Prerequisites: SOC 201, SOC 202 or permission of instructor.

SOC 323 Sociology of Minority Communities (4)

Materials and methods of the sociological study of minority communities; comparisons of minority communities across cultures; 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 lecture-discussions. 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, and junior standing or permission of instructor.

SOC 350 Collective Behavior and Social Movements (4)

Analysis of mass behavior: crowds, riots, fads, fashions, public opinion, and world-wide social movements. 4 lecture-discussions. Prerequisites: SOC 201, 202, or permission of instructor.

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, or permission of instructor.

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 lecture-discussions. 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)

Course emphasizes classroom discussion of ideas raised by sociological theorists and requires students to discover and to question theoretical assumptions. The patterns of thought necessary for critical analysis of sociological theories are systematically outlined and utilized by students. 4 lecture-problems. 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)

Psycho-social aspects of senescence. Aging as a social problem; demographic issues, the aged as a minority. Students select, analyze, and present topics of special interest in this area. Seminar, 4 hours. Prerequisites: SOC 201, 202 and upper division standing.

SOC 430 Sociology of Mental Disorders (4)

An interdisciplinary examination of sociological factors related to the occurrence and prevalence of mental disorders. Wide range of topics, including effects of ethnicity, social class, sex and marital status. 4 seminar-discussions. Prerequisites: SOC 201 and 202 or permission of instructor.

SOC 433 Survey Research (4)

Through development and execution of an original research project, students become experienced with the methodology, strengths, and problems in survey research: unobtrusive measures, sampling, questionnaire construction, interviewing techniques, data analysis. 3 lecture problem solving, 1 two-hour activity. Prerequisites: BHS 204, 205 or equivalent course work in quantitative methods.

For courses in Behavioral Sciences and in Psychology please refer to the appropriate sections of this catalog.

THEATRE AND DANCE

James L. Martin, *Chair*
Gayle Fekete — William H. Morse II — Ann Stabolepszy
Robert L. Gilbert — Leslie Rivers

The Cal Poly Department of Theatre and Dance awards an undergraduate degree in drama which emphasizes production and experience in the "doing" of theatre. At the same time, the Department offers courses in all aspects of the theatre, both artistic and academic. The program stresses concern for students as artists and individuals; faculty, staff and students work closely together to build for the student a solid foundation of knowledge of both the practical and artistic aspects of theatre and dance.

The Department presents a wide variety of productions to give the student a spectrum of experiences. Main stage productions range from dramas to musicals, from realism to very theatrical styles, from premieres of new plays and dance works to presentations of classics by Shakespeare, Shaw, Moliere and Tennessee Williams. Students participate on main stage not only as actors and dancers, but also as designers and in all of the many technical aspects.

In addition to the main stage season, the Department of Theatre and Dance also offers an opportunity for experimentation in a program of workshops and projects presented in the smaller "black box" theater, where student involvement is strongly encouraged and supported. All productions draw audiences from the university and the community, and contribute greatly to their cultural climates.

In the classroom, students receive intensive training in acting (a series of at least nine acting courses are offered), directing, stagecraft, makeup, stage lighting, costume and scenic design, playwriting, and theater management. A wide range of dance classes benefits the novice as well as the advanced dancer.

Coursework also includes theatre/dance history and criticism, dramatic structure and dramatic literature, to provide intellectual and academic skills which work hand-in-hand with artistic skills.

After completing the drama major at Cal Poly, students are prepared for advanced training in graduate schools; to go into teaching in high schools; or to begin their careers or specialized training in professional theatre, television or film.

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 chair. Detailed information is available from the departmental office.

Dance is a minor program open to all interested students. Course work includes dance techniques, choreography and a general introduction to dance history and forms. Students are encouraged to participate in the annual Student/Faculty Dance Concert and in a variety of informal and/or experimental productions.

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)
Undergraduate Seminiar	DR	461	(2)
Senior Project	DR	462	(2)
Senior Project	DR	463	(2)
Electives chosen from the following courses with the approval of advisor			(17)
Live Theatre-Perf. & Crit.	DR	204	(3)
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)
Scene Design	DR	337	(4)
Improvisation for the Theatre	DR	355	(2)
Styles of Acting	DR	358	(4)
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 COURSES:

Play Production Activity	**DR	244	(6)
Advanced Projects in Theatre	**DR	441	(6)
Intro. to Shakespeare	ENG	203	(4)
or			
Shakespeare	ENG	403	(4)
Art Course			(4)
Music Course			(4)

GENERAL EDUCATION REQUIREMENTS:

Category I: (Pattern 2)

Freshman English 1	ENG	104	(4)

** A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Advocacy and Argument ..... COM 204 (4)
Freshman English II ..... ENG 105 (4)

Category II:
A. Select one course ..... (4)
B. Select one course ..... (4)
C. Select one course ..... (4)
D. Select-one course ..... (4)

Category III:
A. Intro. to Theatre ..... DR 203 (4)
B. Hist. of Civilization ..... HST 101 (4)
or
Hist. of Civilization ..... HST 102 (4)
C. World Literature I ..... ENG 217 (4)
or
World Literature II ..... ENG 218 (4)

Category IV:
A. Select one course ..... (4)
B. Select one course ..... (4)
C. Select one course ..... (4)

Category V:
Select one course ..... (4)

Category VI:
Group 1 Select one course ..... (4)
Group 2 Select one course ..... (4)

Category VII:

12 upper division units, four of these units may be used to replace 4 lower division units in Categories II or IV. See Schedule of Classes for approved packages.

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 DR1 31 (4)
Technical Production ..... DR 132 (4)
Acting ..... DR 151 (4)
Intro to Theatre ..... DR 203 (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)

DANCE MINOR

Modern Dance I-II* and DAN 274
Modern Dance III-IV* OR 4 units of
DAN 274 ..... DAN 273 (4)
Ballet I-II* and DAN 277 Ballet III-IV*
OR 4 units of DAN 277 ..... DAN 276 (4)
Advanced Dance Technique
and Repertory* ..... DAN 279 (2)
Dance Production* ..... DAN 294 (2)
Tech Production or Acting ..... DR 132 or
151 (4)
Improvisation and Basic Choreography. DAN 320 (3)
Choreography* ..... DAN 430 (4)
Dance History ..... DAN 446 (4)
Advanced Projects in Theatre * ..... DR 441 (1)
Electives (Choose 4 units from) ..... (4)
DAN 155 Beginning Tap *
DAN 270-272 Jazz Dance *
DAN 290 Dance Workshop*
DR 244 Play Production Activity *
Total units: 32 (20 lower division, 12 upper division)
(* Courses may be repeated for credit)

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. 2 lectures/problem-solving plus 2-hour activities. May be repeated once for credit.

DR 131 Technical Production (4)

Principles of backstage organization, scenery construction, and costume construction. 2 lectures/problem-solving plus 2 two-hour activities.

DR 132 Technical Production (4)

Principles and techniques of stage lighting and sound, props, and scenic painting. 2 lectures/problem-solving plus 2 two-hour activities.

DR 143 Makeup (1)

Theory and practice in theatrical makeup, including materials, base and lining techniques, old age, character makeup, 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. May be repeated once for credit. 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 up to 6 units each, 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. Consideration of production process: the transformation of dramatic text into live performance. Use of representative plays which illustrate dramatic forms, styles, and meaningful cultural connections. 4 lecture-discussions. Prerequisite: ENG 104 or permission of instructor.

DR 204 Live Theatre Performance and Criticism (3)

Student discusses and attends six to eight performances at various theatres throughout Los Angeles area and meets for post-performance critical evaluations. Student pays for own theatre tickets. May be repeated once for credit. 2 lectures plus 1 three-hour activity.

DR 210 Introduction to American Theatre (4)

Readings chiefly in the 20th century with emphasis upon such representative playwrights as O'Neill, Wilder, Williams, Miller, Hellman, Hansberry, Albee, Baraka, Van Itallie, Wilson, Valdez and Shepherd. Examinination of production style and cultural patterns. 4 lecture-discussions. Prerequisite: ENG 104 or permission of instructor.

DR 233 Drafting for the Theatre (3)

Theatrical drafting techniques, including ground plans, elevations, working drawings, isometrics, cabinet views, light plots, and lighting schedules. Two one-hour lectures, 1 two-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. May be repeated once for credit. 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 and DR 152 and permission of instructor. 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 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, manual and computer control boards, instrument selection, production planning. Participation as crew members for departmental productions. Two lectures, 1 three-hour laboratory. Prerequisite: DR 132 or permission of instructor.

DR 337 Scene Design (4)

Theory and technique for scene design, including perspective drawings, renderings, models, scenic shifting methods, painting elevations, and ground plans. 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. May be repeated once for credit. 2 lecture-discussions, 2 three-hour laboratories. Prerequisite: DR 151, 253, or permission of instructor.

DR 358 Styles of Acting (4)

Theory and practice of various periods and styles of acting, including modern. Two lectures, 2 three-hour laboratories. May be repeated once for credit. Prerequisite: DR 151 and DR 152 and 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. May be repeated for up to 36 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, 152, 253 and permission of instructor. May be repeated once for credit by permission of instructor.

DR 461 Undergraduate Seminar (2)

Reports of senior projects, discussions of professional articles of an appropriate level. 2 lecture-discussions.

DR 462, 463 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 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/problem solving plus 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.

DANCE

DAN 155 Beginning Tap Dance (1)

Basic tap techniques. 1 two-hour fine arts activity.

DAN 202 Introduction to Dance (4)

Survey of dance history, philosophy and forms including western and non-western cultures through lecture and participation. Designed to create an understanding of dance as a fine art. 3 lectures, 1 two-hour fine art activity.

DAN 270–279

May be repeated for additional credit as long as normal academic progress is maintained. May be taken for Credit/No Credit by non-majors.

DAN 270 Jazz Dance I-II (2)

Basic dance emphasizing jazz techniques performed to contemporary music. Two 2-hour fine arts activities.

DAN 271 Jazz Dance III-IV (2)

Intermediate dance emphasizing jazz techniques performed to contemporary music. Two 2-hour fine arts activities. Prerequisites: DAN 270, or permission of instructor.

DAN 272 Jazz Dance V (2)

Advanced dance and jazz dance techniques performed to contemporary music. Two 2-hour fine arts activities. Prerequisites: DAN 271 or permission of the instructor.

DAN 273 Modern Dance I-II (2)

Basic dance emphasizing modern dance techniques. Two 2-hour fine arts activities.

DAN 274 Modern Dance III-IV (2)

Study of intermediate dance, emphasizing modern dance techniques. Two 2-hour fine arts activities. Prerequisites: DAN 273 or permission of instructor.

DAN 276 Ballet I-II (2)

Basic dance emphasizing ballet techniques performed to classical music. Two 2-hour fine arts activities.

DAN 277 Ballet III-IV (2)

Intermediate dance emphasizing ballet techniques performed to classical music. Two 2-hour fine arts activities. Prerequisite: DAN 276 or permission of instructor.

DAN 279 Advanced Dance Technique and Repertory (2)

Modern, jazz and ballet techniques at the advanced level. Emphasis on performance techniques and repertory. Two 2-hour fine arts activities. Prerequisites: DAN 271, 274 or 277 or permission of instructor.

DAN 290 Dance Workshop (1)

Special topics in dance to be announced at the beginning of each quarter. 1 2-hour fine arts activity. May be repreated for credit.

DAN 294 Dance Production (1)

Dance Production activities in preparation for a dance performance. Minimum thirty hours. May be repeated for credit.

DAN 320 Dance Improvisation and Basic Choreography (3)

Improvisational and basic choreographic techniques used to develop dance techniques, movement awareness, creativity and compositional abilities. 1 hour lecture/problem solving, two 2-hour fine arts activities.

DAN 430 Choreography (4)

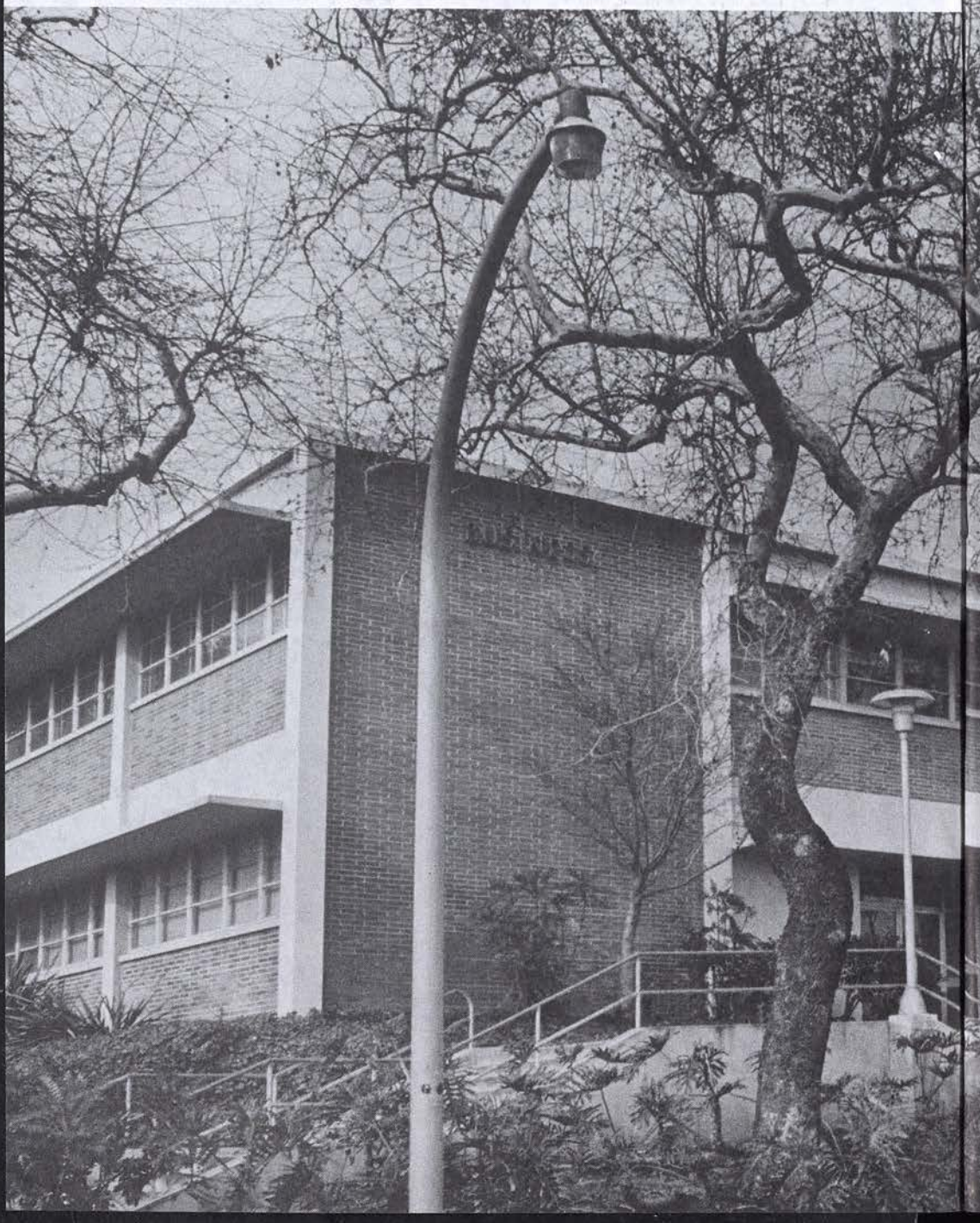
Study of the art of creating movement phrases and dances. Students critically review dance ideas and dances. One 2-hour lecture/problem solving, two 2-hour fine arts activities. Prerequisites: DAN 320 or permission of the instructor.

DAN 446 Dance History (4)

The place of dance in various cultures throughout the world from paleolithic times through preclassic forms to the non-literal dance of today. 4 lecture-discussions.

DAN 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.



COLLEGE OF BUSINESS ADMINISTRATION



COLLEGE OF BUSINESS ADMINISTRATION

Ronald W. Eaves, *Dean*
Donald L. Bell, *Associate Dean for Academic Affairs*
Eric J. McLaughlin, *Associate Dean for Administration*
Rochelle A. Kellner, *Director, Student Support Services*
Rhonda Rhodes, *Director, Graduate Programs*

The College of Business Administration provides six curricula leading to the Bachelor of Science degree in Business Administration. 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 one option, EDP Auditing. Information concerning the masters curricula may be found in the graduate listings.

The undergraduate programs of study give the student an understanding of the social and economic environment in which we live and 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 College 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.

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 the student will receive academic credit. General education courses are integrated throughout each major program. Co-curricular opportunities related to the course of study include the Cal Poly Society of Accountants; American Marketing Association; American Production & Inventory Control Society; Black Business Student Association; Delta Sigma Pi, a professional business fraternity; Finance Society; Latino Business Students Association; Law Society; M.B.A. Association; Management Information Systems Student Association; Personnel and Industrial Relations Association; Pi Sigma Epsilon; Real Estate and Development Network; Society for Advancement of Management; Society for Contracts Administration; United Shareholders Association Research Group; World Traders; Delta Mu Delta and Mu Kappa Tau, business honorary societies.

INDUSTRIAL RESEARCH INSTITUTE FOR PACIFIC NATIONS (IRIPAC)

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 College 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.

THE REAL ESTATE RESEARCH COUNCIL

The Real Estate Research Council of Southern California is the oldest non-profit real estate data organization in the United States. Founded in 1939, the RERC produces a quarterly publication, *The Real Estate and Construction Report*, which includes data on the economy and real estate markets in the seven urban Southern California counties and presents the report at a quarterly luncheon. The senior real estate faculty direct students who participate in the data gathering and analyses for the preparation of the quarterly report. Members of the RERC include major development companies, financial institutions, appraisers, investors, mortgage bankers, and other firms and individuals interested in Southern California Real Estate. RERC is coordinated by faculty in the Finance, Real Estate and Law Department.

BUSINESS EDUCATION CENTER

The major role of the College of Business Administration's Business Education Center is to improve the quality of business education in the secondary and adult schools, as well as regional occupational programs and centers. The services provided include recruitment and selection of new teachers, retraining of existing business teachers, and research and curriculum development. The activities in support of these services are workshops for business teachers, technical assistance for specific school sites, and regional and statewide conferences. The three major components of the Center are: Marketing and Office Education Programs, the Business Teacher Education Program, and the Designated Subjects Credential Program. The Business Education Center publishes the *California Marketing Education Journal* and the *California Statewide Business Education Newsletter*, both of which focus on emerging technologies and related services in business education. Students interested in teaching in California's numerous secondary business programs should contact the Business Education Center for additional information on the Business Teacher Education Program.

DEPARTMENTS AND MAJORS/OPTIONS

MASTER OF BUSINESS ADMINISTRATION (MBA)
Rhonda Rhodes, *Graduate Director*

Options in:
- Accounting
- Agribusiness
- Contract Management
- Entrepreneurship
- Finance, Real Estate and Law
- Information Management
- International Marketing
- Management and Human Resources
- Marketing
- Operations Management
- Real Estate

MASTER OF SCIENCE IN BUSINESS ADMINISTRATION
With option in EDP Auditing

BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION with majors offered by the following departments:
- Minor in Business
- Minor in International Business

ACCOUNTING
Vicki Nycum, *Chair*
- Minor in Accounting
- Minor in Financial Analysis

COMPUTER INFORMATION SYSTEMS
Carl J. Clavadetscher, *Chair*
Minor in Business Computer Programming
Minor in Managerial Computing

FINANCE, REAL ESTATE, & LAW
Andrew F. Whitman, *Chair*
Minor in Business Law
Minor in Financial Analysis
Minor in Financial Management of Public and Private Contracts
Minor in Real Estate

MANAGEMENT & HUMAN RESOURCES
Gene L. Houser, *Chair*
Minor in Administrative Management
Minor in Human Resources Management
Minor in Small Business Management

MARKETING MANAGEMENT
Patricia Hopkins, *Chair*
Minor in Fashion Merchandising
Minor in Marketing Management
Minor in Logistics

OPERATIONS MANAGEMENT
Ralph H. Miller, *Chair*
Minor in Interdisciplinary Quantitative Research
Minor in Logistics

COURSES REQUIRED OF ALL BUSINESS ADMINISTRATION MAJORS

Each student who enrolls for a Bachelor of Science Degree in Business Administration is required to select one of the six majors listed above. For all business majors, each student will be required to take the following courses:

CORE COURSES IN MAJOR

REQUIRED OF ALL BUSINESS MAJORS

Legal Environment of Business Trans...	FRL	201	(4)
Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
Principles of Management.....	MHR	301	(4)
Principles of Marketing Mgmt.....	MKT	301	(4)
Intro to Financial Mgmt I.....	FRL	304	(4)
Management Info Systems	CIS	310	(4)
Managerial Statistics.....	OM	314	(4)
Production & Operations Mgmt I.....	OM	331	(4)
Management Policies & Systems	MHR	410	(4)
or Management Policies & Systems..	OM	411	

MICROCOMPUTER PROFICIENCY

All students in any College of Business Administration major, and all other students taking certain business courses, must demonstrate proficiency with four specific microcomputer software packages. The proficiency must be demonstrated prior to taking any business course with the term "microcomputer proficiency" in the prerequisite list. Some business courses identify specific microcomputer packages in their prerequisite lists. In these cases, proficiency in the noted packages must be demonstrated prior to taking the course.

The four software packages in which the student must be proficient are DOS for a standard IBM microcomputer, and specified packages for word processing, spreadsheet and database. See the Microcomputer Skills Testing Administrator in the CIS Department for information on the specific packages, testing procedures, and resources for self study.

Microcomputer proficiency may be proven in one of three ways:

1. A passing grade in CIS 110 or CIS 111 taken in Summer Quarter 1990 or earlier qualifies the student in all four software packages.
2. The student may take CIS 101 Introduction to Microcomputing and earn a minimum grade of "C" to prove microcomputer proficiency in all four areas.
3. The student may take and pass four hands-on tests—one in each of the required microcomputer packages.

A student receiving transfer credit for CIS 110 or CIS 111 must take the hands-on tests or take CIS 101 to demonstrate proficiency. In all cases where tests will be used to meet the prerequisite requirement, students must take and pass the tests before beginning preregistration to take the course requiring microcomputer proficiency. Check with the Microcomputer Skills Testing Administrator in the CIS Department for more information, including the testing schedule.

COLLEGE-WIDE COURSES

COURSE DESCRIPTIONS

BUS 112 Success Strategies for Business Majors

Learning techniques for freshmen and new transfer students in business majors to achieve academic and professional success. Emphasizes interaction with faculty advisors, the business community, and student organizations, career planning, and campus resources. 4 lecture-problem solving.

BUS 299 Special Topics for Lower Division Students (1–4)

Individual or 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. Prerequisites: permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

BUS 362 China As a Cultural Entity

Direct field investigation of China as a cultural entity with attention to the central issues confronting this complex society. These issues include relationship and influence of China's history on the present dynamics of contemporary Chinese culture. 4 lecture-problem solving. Prerequisite: Consent of instructor. (Also listed as SA 362)

BUS 432 The Use and Role of Technology in China

Direct field investigation and academic study of productive processes and application of technology within China. Barriers and incentives for new technology; decision making; industry specific technology; and role of foreign countries as providers. Technology tradeoffs: environment, employment, and currency reserves. 4 lecture-problem solving. Prerequisite: Consent of instructor. (Also listed as SA 432)

BUS 452 Political Economy and Business Practices in China

Direct field investigation and academic study of historical and current productive/political organization of China. State ownership and the mixed economy; economic objectives and planning. Business organization; incentives and decision making; and management. Cross cultural comparison with Western enterprise. International trade. 4 lecture-problem solving. Instructional materials, activities and facilities charges. Prerequisite: Consent of instructor. (Also listed as SA 452)

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 Small Business Institute 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 College 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. A maximum of 4 units for each course. Prerequisite: Consent of instructor. Courses must be taken in ascending sequence.

BUS 482 China and the United States: Cross Cultural Analysis

Examination of critical areas of U.S. and Chinese cultures that provide insights and understanding of the comparative differences of these two civilizations; historical and contemporary differences. 4 lecture-problem solving. Instructional materials, activities and facilities charges. Prerequisite: Consent of instructor. (Also listed as SA 482)

BUS 499 Special Topics for Upper Division Students (1–4)

Individual or 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. Prerequisites: Consent of instructor. Instruction is by lecture, laboratory, or a combination of both.

BUSINESS MINOR

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 College of Business Administration has designed, in addition to the minors available within majors, a broad-based schoolwide minor to meet these needs. Non-business students desiring more information should contact the Student Advising Center of the College of Business Administration. The student should formally enroll in the Minor before taking courses. A Minor Advisor is available to assist students.

Other specialized business minors are offered by each department within the College of Business Administration. Refer to individual department listings on the following pages for more information about specialized business minors.

The student must demonstrate microcomputer proficiency (as discussed above) and complete the following required courses to fulfill the requirements for a minor in business:

Financial Accounting	ACC	224	(4)	Organizational Behavior	MHR	318	(4)
Financial Accounting	ACC	225	(4)	Principles of Management	MHR	301	(4)
Introduction to Financial Mgmt I	FRL	304	(4)	Principles of Marketing Mgmt	MKT	301	(4)
Management Info Systems	CIS	310	(4)				

The student must also select 8 units from the following list of electives:

Intro to Systems Analysis and Design	CIS	266	(4)	Travel Management	HRT	201	(4)
Managerial Computing	CIS	301	(4)	Human Resources Management	MHR	311	(4)
Executive Support and Expert Systems	CIS	401	(4)	First-Line Management	MHR	313	(4)
Principles of Economics	EC	201	(4)	Communications for Management	MHR	324	(4)
Principles of Economics	EC	202	(4)	Professional Selling	MKT	208	(4)
Legal Env of Business Trans	FRL	201	(4)	Transportation Systems and Traffic	MKT	319	(4)
Investment Analysis	FRL	330	(4)	Marketing for Small Business	MKT	404	(4)
Introduction to Leisure Industry	HRT	101	(4)	Marketing of Services	MKT	316	(4)

MINOR IN INTERNATIONAL BUSINESS

The College of Business Administration offers a Minor in International Business for students majoring in other fields within the College of Business and students from other Colleges of the University who have an interest in pursuing careers that are related to international business. The purpose of the minor is to provide sufficient knowledge and expertise in International Business for students to successfully apply the specialties of their fields to international careers.

The minor is comprised of required and directed elective courses. Most students already in the College of Business Administration will be able to take the required courses with at most one additional prerequisite course in addition to those required in their fields. Students from outside the College of Business Administration must complete a number of courses in Business and Economics before those required in the International Business minor can be taken. Directed elective courses can be taken *either* in Foreign Languages, a Regional Area of Emphasis, an appropriate Depth or Theme group of courses (*some* of which also satisfy General Education Category VII requirements) *or* courses which constitute a Survey of International Development.

The student is responsible for meeting the requirements of the minor program in effect when the formal Contract for the Minor in International Business is signed. The contract should be signed before coursework in the Minor is begun.

To enroll in the Minor or for more information about it, see the International Business Minor Advisor.

CONTINUING EDUCATION IN BUSINESS

Many individual courses offered in the College 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 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 obtained by contacting the office of the Dean of Continuing Education at Kellogg West on campus. The College of Business Administration also provides credit or non-credit programs for business organizations on-site. Further information can be obtained by contacting the dean of the College of Business Administration.

To be eligible to take undergraduate courses in the College of Business Administration for degree credit, a person must be formally admitted to the University. Admission requirements are found in the front section of this catalog. Graduate courses and entrance requirements are listed in the graduate section of this catalog.

ACCOUNTING

Vicki Nycum, *Chair*
Willie D. Adamson
John K. Cheever
Steve Driscoll
Keith B. Ehrenreich
Frank Ewing-Chow
Vinay K. Gupta
Antoine G. Jabbour
Rochelle A. Kellner
Merrill Lewis
Donald F. Putnam
Anwar Y. Salimi
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 and not-for-profit 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.

PREREQUISITE CORE FOR UPPER DIVISION ACCOUNTING PROGRAM

Before enrolling in the upper-division courses in the Accounting Program, accounting majors are expected to have completed college-level courses in English, mathematics/statistics, economics, computers, business law, and introduction to accounting.

Students must have earned a grade of "C" (2.0) or better in each of the ten identified lower-division courses *before* registering for any upper-division accounting course. The identified courses are as follows:

ENG 104 and 105
CIS 101 or microcomputer proficiency
MAT 125 and STA 120
FRL 201
EC 201 and 202
ACC 224 and 225

Nonaccounting majors are expected to have met the above requirements to the extent that the cited courses or their equivalents are included in the requirements of their major.

CORE COURSES IN MAJOR*

REQUIRED OF ALL BUSINESS MAJORS**

Legal Environment of Business Trans	FRL	201	(4)
Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
Principles of Management	MHR	301	(4)
Principles of Marketing Mgmt.	MKT	301	(4)
Intro to Financial Mgmt I	FRL	304	(4)
Management Info Systems	CIS	310	(4)
Managerial Statistics	OM	314	(4)
Production & Operations Mgmt I	OM	331	(4)
Management Policies & Systems	MHR	410	(4)
or Management Policies & Systems	OM	411	

ACC REQUIRED COURSES

Cost Accounting	ACC	300	(4)
Intermediate Acctg	ACC	301	(4)
Intermediate Acctg	ACC	302	(4)
Intermediate Acctg	ACC	303	(4)
Acctg & Computer	ACC	312	(4)
Advanced Cost Acctg	ACC	412	(4)
Auditing Theory	ACC	419	(4)
Federal Tax I	ACC	431	(4)
Senior Project	ACC	461	(2)
Acctg Theory & Research	ACC	465	(4)

OTHER COURSES TO COMPLETE MAJOR

Legal Env Bus Org	FRL	302	(4)
Intro to Fin Mgmt II	FRL	305	(4)
Career Tracks (See Department for List of Career Tracks and Electives)			(12)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

SUPPORT COURSES

Principles of Economics	EC	202	(4)
Writing for the Professions	ENG	301	(4)
Money and Banking	EC	408	(4)
Intro to Calculus for Bus	MAT	125	(4)
Free Electives			(12)

GENERAL EDUCATION COURSES

Advocacy and Argument	COM	204	(4)
Amer Civilization	AMC	201	
or Intro Amer Govt	PLS	201	(4)
Amer Civilization	AMC	202	
or U.S. History	HST	202	(4)
Org Com Theory	COM	314	(4)
Com Prob Analysis	COM	321	(4)
or Group Discussion	COM	337	
Elementary Statistics w/Appl	STA	120	(4)
Ethics	PHL	204	(4)
or Business Ethics	PHL	205	
Freshman English I	ENG	104	(4)
Freshman English II	ENG	105	(4)
General Psychology	PSY	201	(4)
Interpersonal Compt	MHR	318	(4)
Principles of Economics	EC	201	(4)
Additional Units of General Education (See Advisor)			(24)

** Microcomputer proficiency must be demonstrated by passing skills test or CIS 101 Introduction to Microcomputing.

MINOR IN ACCOUNTING

The Accounting Department provides nonAccounting majors with the opportunity to acquire accounting knowledge and skills by completing the requirements for the Minor in Accounting as outlined below. The purpose of the minor is (1) to develop marketable skills for persons with majors other than Accounting, (2) for those students majoring in technical fields that involve the direct or indirect use of the knowledge and skills of accounting, and (3) for those students who wish to gain a better understanding of accounting for personal use.

It is possible for students majoring in most nonAccounting fields to complete the minor within the normal requirements of their degrees through careful planning and scheduling of their required and elective courses.

No courses in the minor program may be waived or substituted. The student is responsible for meeting the requirements of the minor program that is in effect *at the date of the signing* of the formal contract for the Minor in Accounting. It is recommended that the contract be signed by the student *before* beginning the minor program.

For more information or to enroll in the minor, contact the Minor Coordinator of the Accounting Department.

COURSES IN MINOR:

CORE (24 Units):

Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
Cost Accounting	ACC	300	(4)
Intermed Accounting	ACC	301	(4)
Intermed Accounting	ACC	302	(4)
Intermed Accounting	ACC	303	(4)

DIRECTED ELECTIVES (8 Units):

Select one of the following 8-unit combinations (each course 4 units):

Financial: ACC 401 and ACC 403 or ACC 465

Managerial: ACC 412 and ACC 413

Auditing: ACC 419 and ACC 420 or ACC 424, or CIS 433

Auditing/Taxation; ACC 419 and ACC 431

Government and Not-For-Profit: ACC 426 and ACC 428

Taxation: ACC 431 and ACC 432

Other combinations require special approval by the Minor Coordinator and Accounting Department Chairperson.

MINOR IN FINANCIAL ANALYSIS

The Accounting Department provides nonAccounting majors with the opportunity to acquire skills to qualify for positions such as cost/budget analyst and the defense industry equivalent, project control analyst. It will greatly benefit Finance majors interested in careers as bankers and as financial planners. Operation Management majors will be able to combine their skills in quantitative methods, especially forecasting, with the ability to work with accounting records.

The student is responsible for meeting the requirements of the minor program that are in effect at the date of the signing of the formal contract for the minor in Financial Analysis. It is recommended that the contract be signed by the student before beginning the minor program. For more information or to enroll in the minor, contact the minor coordinator of the Accounting Department.

COURSES IN MINOR:

CORE (28 units):

Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
Financial Statement Analysis	ACC	226	(4)
Managerial Accounting	ACC	310	(4)
Management Science	OM	315	(4)
Bus For & Fin Pln	FRL	363	(4)
or			
For Meth for Mgmt	OM	415	
Decision Support Systems	OM	350	(4)
or			
Financial Simulation	FRL	467	

DIRECTED ELECTIVES (4 units):

Select 4 units of course work from courses with an ACC prefix.

Course Descriptions

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 224, 225 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 cash flows. ACC 224 is a prerequisite to ACC 225. 4 lecture-problem solving.

ACC 226 Financial Statement Analysis (4)

Analysis and use of financial reports. Emphasis on interpretation of end result to prepare student to better understand and analyze actual financial reports. Statements used extensively in illustrations, problems, cases, and analysis. 4 lecture-problem solving. Not open to accounting majors. Prerequisites: ACC 225, and Math 125 or OM 315.

ACC 231 Personal Taxation and Planning (4)

Basic principles of taxation and their application to personal financial planning, including tax return preparation. Not open to accounting majors. Credit will not be granted for both ACC 231 and ACC 431. 4 lecture-problem solving.

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 300 Cost Accounting (4)

Cost accounting cycle; cost elements of product/service; job order, process and standard cost systems; overhead allocation considerations; cost behavior; cost-volume-profit relationships; analysis of overhead variances. 4 lecture-problem solving. Prerequisites: ACC 225, ENG 105 (ENG 104 for nonaccounting majors), STA 120 and MAT 125 (STA 120 or MAT 125 for nonaccounting majors), FRL 201, EC 201, EC 202, and CIS 101 or microcomputer proficiency.

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 lecture-problem solving. Prerequisites: Minimum grade of "C" (2.0) in ACC 300 and consent of instructor. Minimum grade of "C" (2.0) required in ACC 301 to advance to ACC 302, and a minimum grade of "C" (2.0) 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. Short case studies. 3 lecture-problem solving, one 2-hour activity. Prerequisites: ACC 302 (ACC 225 for nonaccounting majors), and CIS 101 or microcomputer proficiency.

ACC 310 Managerial Accounting (4)

Control and decision-making, budgets, cost analysis and typical situations/problems. Not open to Accounting majors. Credit will not be granted for both ACC 300 and ACC 310. 3 lecture-problem solving, one 2-hour activity. Prerequisites: ACC 225 and CIS 101 or microcomputer proficiency.

ACC 312 Accounting and the Computer (4)

The application of microcomputers to accounting problems using spreadsheet, database, and business graphics software. Accounting cases to include financial analysis, budgeting, amortization tables, net present value, product costing, and inventory valuation. 4 lecture-problem solving. Prerequisites: ACC 300 or ACC 310, and CIS 101 or microcomputer proficiency.

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 advanced financial accounting topics, including leases, interim reporting, discontinued operations, segmental reporting, partnerships, and accounting for effects of changing prices. Heavy reliance upon official pronouncements to determine proper footnote disclosures. 4 lecture-problem solving. Prerequisite: Minimum grade of "C" (2.0) in ACC 303.

ACC 403 Consolidation and Foreign Currency Accounting (4)

Analytical study and application of principles of consolidation and foreign currency translation. 4 lecture-problem solving. Prerequisite: Minimum grade of "C" (2.0) in ACC 302.

ACC 404 International Accounting (4)

Examination and discussion of accounting theories, techniques, procedures, accounting standards and regulations used in other nations. Examination of contemporary practices prevailing in different parts of the world. Emphasis on multinational corporations, and their needs and practices. 4 lecture-problem solving. Prerequisite: ACC 401.

ACC 412 Advanced Cost Accounting (4)

Cost accounting techniques not covered in ACC 300, including joint products, service department allocations, profit centers, use of cost accounting for profit centers, use of cost accounting for special managerial decisions, inventory planning and control, quality control and transfer pricing. 3 lecture-problem solving, one 2-hour activity. Prerequisite: minimum grade of "C" (2.0) in ACC 300.

ACC 413 Controllership (4)

Analysis of controllership function in a business organization, and general problems of accounting controls. Cases and/or problems. 4 lecture-problem solving. Prerequisite: Senior Standing.

ACC 414 Accounting for Government Contracts (4)

Federal Acquisition Regulations Systems as related to government procurement, types of government contracts and roles of contracting officers and contract auditors in contract administration, cost accounting standards and related regulation, and termination of government contracts. 4 lecture-problem solving. Prerequisites: ACC 300 and ACC 412.

ACC 419 Auditing Theory (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 lecture-problem solving. Prerequisites: Minimum grade of "C" (2.0) in ACC 302 (Substitute ACC 305 for nonaccounting majors), OM 314.

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. Major project. 3 lecture-problem solving, one 2-hour activity. Prerequisite: Minimum grade of "C" (2.0) in ACC 303 and 419.

ACC 422 SEC and Specialized Industries (4)

Study of Securities Exchange Commission, the required filings and regulations. Review of specific accounting theory applications to selected industries. Audit considerations. Relationship of SEC, FASB and Congress. 4 lecture-problem solving. Prerequisite: Minimum grade of "C" (2.0) in ACC 419.

ACC 424 Internal Auditing (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-problem solving. Prerequisite: Minimum grade of "C" (2.0) in ACC 419.

ACC 426 Government and Not-For-Profit Accounting (4)

Governmental and institutional accounting and accounting for fiduciaries. 4 lecture-problem solving. Prerequisite: Minimum grade of "C" (2.0) in ACC 302 or consent of instructor.

ACC 428 Management Control in Not-For-Profit Organizations (4)

In-depth study of processes of budgeting, planning, and controlling in governmental, hospital, and educational institutions. 4 lecture-problem solving. Prerequisites: ACC 300 or ACC 310.

ACC 431 Federal Tax I (4)

Incomes, expenses, exclusions, deductions, and credits for individual tax returns. 4 lecture-problem solving. Prerequisite: Minimum grade of "C" (2.0) in ACC 301 (ACC 305 for nonaccounting majors).

ACC 432 Federal Tax II (4)

Federal taxes on partnerships, corporations, estates, trusts, reorganizations and tax planning. 3 lecture-problem solving. One 2-hour activity. Prerequisite: Minimum grade of "C" (2.0) in ACC 431.

ACC 434 Practice of Income Tax Preparation (2)

Federal and state income tax laws as related to individuals; tax return preparation, under faculty supervision, for the elderly and low-income taxpayers. One 4-hour activity. Prerequisites: ACC 431 or ACC 231 or concurrent enrollment.

ACC 435 Tax Research and Planning (4)

Development of tax research capabilities; interpreting statutes, cases, and rulings; and communicating research results within an environment of individual and business tax planning and analysis. Administrative judicial procedures governing tax controversies. 3 seminar discussion, one 2-hour activity. Prerequisites: Minimum grade of "C" (2.0) in ACC 431 and consent of instructor.

ACC 436 Taxation of Real Estate Transactions (4)

Taxation of gains and losses and other items related to sales, exchanges and other transactions involving real estate. 4 lecture problem solving. Prerequisite: FRL 305.

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. Total credit limited to eight units each. Maximum of four units of Specialty Options may be satisfied by internship. Prerequisite: Permission of the Director of the Internship Program, Accounting Department.

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. Maximum of four units of Speciality Options may be satisfied by internship. Prerequisite: Minimum grade of "C" (2.0) in ACC 419, and consent of the Director of the Internship Program, Accounting Department.

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: Minimum grade of "C" (2.0) in 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: Minimum grade of "C" (2.0) in 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. Four seminar discussions. Prerequisite: Minimum grade of "C" (2.0) in ACC 303 and ACC 419 and Senior Standing.

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.

COMPUTER INFORMATION SYSTEMS

Carl J. Clavadetscher, *Chair*
Thomas H. Athey
Donald L. Bell
John B. Crawford
Vijay D. Deokar
Ronald W. Eaves
Shepperd Gold
Koichiro R. Isshiki
Michael J. Klosky
Robert Lawrence
Ida W. Mason
Patrick C. Olson
John W. Satzinger
Robert V. Stumpf
Lavette C. Teague
Ward D. Testerman
Gerald E. Wagner
Susan J. Wilkins

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, telecommunications analyst, project leader, data processing manager, and information center manager, consultant, or product specialist.

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 two minors: Business Computer Programming and Managerial Computing. The purpose of these minors 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 9, Room 324, 869-3235 if you are interested in enrolling in either of these minors.

CORE COURSES IN MAJOR*

Required of all Business Majors **

Legal Environment of Business Trans...	FRL	201	(4)
Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
Principles of Management	MHR	301	(4)
Principles of Marketing Mgmt.	MKT	301	(4)
Intro to Financial Mgmt I.	FRL	304	(4)
Management Info Systems	CIS	310	(4)
Managerial Statistics	OM	314	(4)
Production & Operations Mgmt I.	OM	331	(4)
Management Policies & Systems	MHR	410	(4)
or Management Policies & Systems..	OM	411	

CIS REQUIRED COURSES:

Intro to Systems Analysis and Design ..	CIS	266	(4)
Structured Programming Concepts.	CIS	274	(4)
Computer-aided Systems Development.	CIS	325	(4)
Database Development	CIS	326	(4)
Information Systems Careers.	CIS	328	(2)
Rapid Systems Development	CIS	406	(4)

EACH CIS MAJOR WILL SELECT 7 COURSES (28 UNITS) FROM THE FOLLOWING. SELECTION DEPENDS ON CAREER TRACK SELECTED AND ADVISOR CONSULTATION. (28)

Telecommunications in Info Systems...	CIS	287	(4)
Managerial Computing.	CIS	301	(4)
Distributed Databases	CIS	334	(4)
Data Modeling	CIS	345	(4)
Local and Wide Area Networks.	CIS	347	(4)
Microcomputer Application Development	CIS	354	(4)
Software Maintenance and Enhancement	CIS	362	(4)
Network Modeling	CIS	367	(4)
Executive Support and Expert Systems .	CIS	401	(4)
Information Systems Planning.	CIS	411	(4)
Advanced Systems Analysis and Design.	CIS	415	(4)
Software Quality Assurance	CIS	423	(4)
Business Systems Analysis	CIS	425	(4)
EDP Auditing.	CIS	433	(4)
Network Management	CIS	437	(4)
Human Factors in Systems Design	CIS	445	(4)
Programming Development Project.	CIS	466	(4)
Telecommunications Project.	CIS	467	(4)
Information Center Concepts	CIS	471	(4)
Computing Support Project.	CIS	481	(4)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

**Microcomputer proficiency must be demonstrated by passing a skills test or CIS 101 Introduction to Microcomputing.

SUPPORT AND ELECTIVE COURSES

BUSINESS/ECONOMICS SUPPORT COURSES

Organizational Behavior in a Multi-Cultural Environment	MHR	318 *	(4)
Select one from the following list:			(4)
Principles of Economics	EC	202	(4)
Accounting Information Systems	ACC	305	
Intro to Financial Mgmt II	FRL	305	
Market Analysis and Control	MKT	320	
Telecommunications and Office Automation	OM	340	
Training and Development	MHR	405	

* If MHR 318 used to satisfy a GE requirement, select two from the above list.

Select two additional Business/Economics Support Courses with career track advisor approval ..... (8)

NON-BUSINESS/ECONOMICS SUPPORT COURSES

Select 4 units from the following list:			(4)
Acting	DR	151	(4)
Public Speaking	COM	100	(4)
Interpersonal Communication	COM	103 -	(4)
Debate	COM	155	(2)
Forensics Practices	COM	' 255	(2)
Forensics Practices	COM	355	(2)
Forensics Practices	COM	455	(2)
Group Discussion	COM	337	* * (4)
Small Group Communication	COM'	339 '	(4)

* * Com 337 may not be selected if used to satisfy a GE requirement.

Select one additional Non-business/Economics Support Course with career track advisor approval ..... (4)

GENERAL EDUCATION

(Required of all students)

Freshman English I	ENG	104	(4)
Freshman English II	ENG	105	(4)
Advocacy and Argument	COM	204	(4)
Business and Professional Ethics	PHL	205	(4)
Amer Civiliz	AMC	201	' (4)
or Intro Am Govt	PLS	201	
Amer Civiliz	AMC	202	(4)
or U.S. History	HST	202	
Princ of Economics	EC	201	' (4)
General Psychology	PSY	201-	(4)
Elementary Statistics with Applications	STA	120	(4)
Units to complete General Education			(36)

CAREER TRACKS IN CIS

The Computer Information Systems Department has established four career tracks in the major. These are: 1) Applications Software Development, 2) Business Systems Analysis, 3) Information Center Consulting, and 4) Telecommunications Analysis. Every CIS major must select one of these career tracks after taking CIS 328, and after having consulted with a CIS faculty advisor. The career track selected will dictate which upper division CIS electives the student will take, with the courses specified in a written contract with the CIS faculty advisor. The contract terms must be met in order for the student to graduate with a major in CIS.

Also, as noted above in the list of support courses, a total of three support courses (12 units) must be selected during consultation with a CIS career track faculty advisor. These three courses will also be itemized in the career track contract and must be taken in order to graduate with a major in CIS.

MICROCOMPUTER PROFICIENCY

The College of Business Administration has established a requirement that all students with a major in any CBA department demonstrate microcomputer proficiency. In particular, the student must prove this proficiency before registering for any course with either an explicit or hidden microcomputer proficiency prerequisite. (A hidden prerequisite is a prerequisite to a stated prerequisite for the course which the student wishes to take. For example, microcomputer proficiency is an explicit prerequisite of CIS 310 but is a hidden prerequisite to CIS 325 because CIS 325 requires CIS 310 as an explicit prerequisite, which in turn requires microcomputer proficiency.) See the section in this catalog entitled "College of Business Administration" for information on how to demonstrate microcomputer proficiency.

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 9—Room 324, Extension 3235.

Courses for Minor (72 units)

Microcomputer proficiency (see explanation above)			
Freshman English I	ENG	104	(4)
Freshman English II	ENG	105	" (4)
Elementary Statistics with Applications	STA	120	(4)
Principles of Economics	EC	201	(4)
Legal Environment of Business Transactions	FRL	201	(4)
Advocacy and Argument	COM'	204	(4)
Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
Principles of Management	MHR	301	(4)
Principles of Marketing Management	MKT	301	(4)
Introduction to Financial Management I.	FRL	304	' (4)
Intro to Systems Analysis and Design	CIS	266	(4)
Management Information Systems	CIS	310	' (4)
Structured Programming Concepts	CIS	- 274	(4)

Telecommunications in Information Systems	CIS	287	(4)
Computer-aided Systems Development	CIS	325	(4)
Database Development	CIS	326	(4)
Rapid Systems Development	CIS	406	(4)

MINOR IN MANAGERIAL COMPUTING

The Computer Information Systems Department provides non-CIS majors with the opportunity to acquire the background to effectively use and train others in the use of computing resources. These resources include those used for word processing, spreadsheets, database inquiry and decision support. The purposes of this minor are to provide students with the knowledge and skills necessary (1) to effectively use the computing resources found in modern organizations, (2) to train and aid others to use managerial computing resources, (3) to manage the use of computing resources by organizational staff members, (4) to evaluate, select and install managerial computing resources, and (5) to perform information requirements planning.

For more information or to enroll in the minor, please contact the CIS department Secretary in Building 9—Room 324, Extension 3235.

Courses for Minor (68 units)

Microcomputer proficiency (see explanation above)			
Freshman English I	ENG	104	(4)
Elementary Statistics with Applications	STA	120	(4)
Principles of Economics	EC	201	(4)
Legal Environment of Business Transactions	FRL	201	(4)
Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
Principles of Management	MHR	301	(4)
Principles of Marketing Management	MKT	301	(4)
Introduction to Financial Management I	FRL	304	(4)
Managerial Statistics	OM	314	(4)
Intro to Systems Analysis and Design	CIS	266	(4)
Managerial Computing	CIS	301	(4)
Management Information Systems	CIS	310	(4)
Executive Support and Expert Systems	CIS	401	(4)
Information Systems Planning	CIS	411	(4)
Computing Support Project	CIS	481	(4)
Advisor Approved Elective			(4)

Course Descriptions

CIS 101 Introduction to Microcomputing (4)

Four course modules covering (1) introduction to microcomputers and DOS; (2) word processing; (3) spreadsheet, and (4) microcomputer database. Each module will involve problem solving using specific, detailed instruction in the software package adopted by the College of Business Administration. 4 lecture/problem-solving.

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 business and personal computers in society. 4 lectures.

CIS 111 Introduction to Business Personal Computing (4)

Introduction to computer information systems vocabulary and concepts. Characteristics, capabilities and operations of microcomputers. Application of personal computing software to introductory problems in text processing, communications, data base inquiry, report generation, graphics, data analysis and programming. 4 lecture/problem-solving.

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. May be graded on CR/NC basis.

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 266 Introduction to Systems Analysis and Design (4)

Application of structured analysis and design methods and tools to the development of information systems. Programming in SQL for database implementation and inquiry. 4 lecture/problem-solving. Prerequisites: Microcomputer proficiency, ENG 104, STA 120, EC 201, FRL 201, and ACC 225.

CIS 274 Structured Programming Concepts (4)

Application of structured programming techniques to the development of information systems software. Emphasis on program logic design. COBOL program development in a mainframe, time-sharing environment. Testing and debugging techniques. 4 lecture/problem-solving. Prerequisite: CIS 266.

CIS 287 Telecommunications in Information Systems (4)

A basic introduction to telecommunications systems: hardware transmission media, protocols for local area networks and error recovery procedures. This rapidly expanding field will be viewed from the potentials it provides as well as the associated problems currently occurring. 4 lecture/problem-solving. Prerequisite: CIS 274.

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 301 Managerial Computing (4)

Advanced use of microcomputers and microcomputer application software packages to solve complex business information problems. Skill enhancement in the use of computing resources, such as spreadsheets, databases, and nonprocedural programming languages. 4 lecture/problem-solving. Prerequisites: ACC 225, and microcomputer proficiency.

CIS 310 Management Information Systems (4)

Introduction to the application of information technology in organizations. The role of business managers and staff professionals in using and developing MIS systems. Case projects. 4 lecture/problem-solving. Prerequisites: ACC 225, MHR 301, and microcomputer proficiency.

CIS 325 Computer-Aided Systems Development (4)

Analysis and design of information systems using computer-aided software engineering (CASE) tools. Database and processing design for systems to be developed using nonprocedural programming tools. Database implementation and updating utilizing a Fourth Generation Language (4GL). 4 lecture/problem-solving. Prerequisites: ENG 105, COM 204, CIS 266, and CIS 310.

CIS 326 Database Development (4)

Data and information requirements analysis. Information modeling and conceptual database design. Database management system components, functions, and models. Using COBOL with embedded SQL for relational database implementation and updating. 4 lecture/problem-solving. Prerequisites: ENG 105, COM 204, CIS 274, and CIS 310.

CIS 328 Information Systems Careers (2)

Career opportunities and specialties within Computer Information Systems. Job search preparation, strategies and techniques. Making good impressions during interviews and on the job. Career planning and enhancement. Individual or group investigation, research, studies, or surveys of selected problems. 2 units. Prerequisites: ENG 105, COM 204, and CIS 274.

CIS 334 Distributed Databases (4)

Techniques for analysis and implementation of network and hierarchical database models. Distribution of databases. 4 lecture/problem-solving. Prerequisites: CIS 287, CIS 325, and CIS 326.

CIS 345 Data Modeling (4)

Advanced data modeling concepts. Relation of data modeling to event modeling. Data modeling for object-oriented and expert systems. Enterprise level modeling. 4 lecture/problem-solving. Prerequisites: CIS 326 and CIS 328.

CIS 347 Local and Wide Area Networks (4)

Analysis of hardware and software used in the design of local and wide area networks. Analysis of transmission media, systems architectures, and cost/benefit tradeoffs. Evaluation of the international and national issues affecting networking. 4 lecture/problem-solving. Prerequisites: CIS 287, CIS 325, CIS 326, and CIS 328.

CIS 354 Microcomputer Application Development (4)

Business program design and development at a professional level. Individual programs in business, graphics, and artificial intelligence applications. Accelerated coverage of a procedural language (BASIC or C) using microcomputers. 4 lecture/problem-solving. Prerequisite: CIS 334.

CIS 362 Software Maintenance and Enhancement (4)

Management, theory, and application of principles of computer systems maintenance. Includes planning, implementation, testing, user-training, installation, and follow-up. Emergency maintenance, requested modifications, and support of vendor-supplied software. 4 lecture/problem-solving. Prerequisite: CIS 334.

CIS 367 Network Modeling (4)

Analysis of telecommunications networks by building network models, simulating the models, analyzing the results of the simulations, evaluating model costs, and selecting the best model within given constraints. 4 lecture/problem-solving. Prerequisites: CIS 287, CIS 325, CIS 326, CIS 328, and OM 314.

† 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. May be graded on CR/NC basis.

CIS 401 Executive Support and Expert Systems (4)

Characteristics of executive and expert systems. The application of executive support and expert system computing resources to complex managerial information problems. Computer projects. 4 lecture/problem-solving. Prerequisites: CIS 266, MKT 301, FRL 304, and CIS 328 (or permission of instructor).

CIS 406 Rapid Systems Development (4)

Rapid systems development methods and tools. Emphasis on the prototyping approach to systems development and human/ergonomic factors in designing user interfaces. Use of 4GLs, front/back-end CASE tools, code generators and similar rapid development tools. 4 lecture/problem-solving. Prerequisites: MKT 301, FRL 304, MHR 318, CIS 325, and CIS 326.

CIS 411 Information Systems Planning (4)

Information needs of business functional areas. Information architectures and information systems planning concepts and practices. Evaluating computing and information resources. Cost-benefit analysis, RFPs/RFQs and implementation planning. 4 lecture/problem-solving. Prerequisites: CIS 406 or permission of instructor.

CIS 415 Advanced System Analysis and Design (4)

Comparison and evaluation of alternative methods for systems analysis and design including Warnier-Orr, Jackson, and Yourdon. Automated tools and techniques for analysis and design of computer information systems. Tailoring system life cycle to project needs. Written reports and case studies. 4 lecture/problem-solving. Prerequisites: CIS 345.

CIS 423 Software Quality Assurance (4)

Certification that software systems meet quality standards. Validation of the requirements, review of project management and external specification, and building test cases. Includes both white and black box testing. 4 lecture/problem-solving. Prerequisite: CIS 326.

CIS 425 Business Systems Analysis (4)

In-depth analysis of information systems applications supporting a broad spectrum of business functions. Horizontally and vertically integrated application systems. Strategic information systems. 4 lecture/problem-solving. Prerequisites: CIS 345 and CIS 411.

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 406 or permission of instructor.

CIS 437 Network Management (4)

Administering and tuning telecommunications networks. Analysis of network components, traffic, security, and failures in the network. An examination of regulatory and legal issues in the field. Analyzing and directing a telecommunications project. 4 lecture/problem-solving. Prerequisites: CIS 347 and CIS 367.

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. Total credit limited to eight units each. Prerequisite: permission of the internship coordinator.

CIS 445 Human Factors in Systems Design (4)

Human factors in information system design. Special consideration of designing the user-computer interaction with attention to interactive computer graphics. Effective presentation of information, perceptual considerations, color phenomena. Integrated interfaces for multiple computer applications. 4 lecture/problem-solving. Prerequisites: CIS 406.

CIS 466 Programming Development Project (4)

Application of computer programming and implementation concepts to a comprehensive group project. Management planning, scheduling and reporting required. Documentation to include programming, testing and users' manuals. Oral and written presentations required for all team members. 4 lecture/problem-solving. Prerequisites: CIS 406 and permission of instructor.

CIS 467 Telecommunications Project (4)

Synthesis and integration of telecommunications concepts and methodology. Application of technical, managerial, communications, and interpersonal skills to a realistic business project in a team environment. 4 lecture/problem-solving. Prerequisite: CIS 437.

CIS 471 Information Center Concepts (4)

Concepts and practices associated with aiding managers and staff to use business personal computing resources. Information Center mission, organization and operations. Training projects and consulting practice. 4 lecture/problem-solving. Prerequisites: CIS 301, CIS 401, and CIS 406 (or permission of instructor).

CIS 481 Computing Support Project (4)

Comprehensive group project in organizational computing support. Management planning, scheduling, and reporting. Emphasis on managerial computing, information center consulting, and computer training projects. Oral and written presentations required of all team members. 4 lecture/problem-solving. Prerequisites: CIS 411 (CIS 471 for CIS majors).

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

Andrew F. Whitman, *Chair*

Richard J. Bergstrom
Michael T. Carney
Robert J. Enders
Hyung K. Jin
Djavad Kashefinejad
Gilbert J. McKee
Eric J. McLaughlin
Velma Montoya
Jeanne L. Morrison
Majed Muhtaseb
David L. Parry
Alvin C. Ruppert
Peter G. Sibbald
Ahmad Sohrabian
Joseph Sudia
Paul F. Weisend
N. Gregory 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, financial institutions, real estate, urban land development, contract management, business law, and insurance and risk management.

Students select one of the three specialties which best meets their career objectives: Finance, Real Estate or Law and one of the career paths within these specialties.

The Finance specialty offers courses on business financial analysis, the management of financial institutions, security analysis and multinational finance.

The Real Estate specialty emphasizes real estate brokerage, mortgage lending, real property and commercial appraising, property management and real property investment/development.

The Business Law and Contract Management specialty helps prepare students for law school, and for careers as contract administrators and contract cost/price analysts.

The department offers three minors: real estate, business law, and financial management of public and private contracts to both non-FRL majors and to FRL majors.

The real estate minor is formulated to qualify the student with the requisite courses to sit for the real estate broker's examination.

The minor in business law encompasses the study of the legal environment of business operations and decision-making.

The minor in financial management of public and private contracts provides sufficient skills and understanding of the principles to enable students to successfully manage commercial contracts, contract cost/price techniques and negotiations, and the Uniform Commercial Code.

Please contact the Department Chair in Building 66, Room 211 (714) 869-2350 or an FRL faculty advisor if you wish to explore any of the course offerings.

PREREQUISITE CORE FOR UPPER DIVISION FINANCE, REAL ESTATE AND LAW PROGRAM

Before enrolling in the upper division courses in the FRL program, FRL majors are expected to have completed college level courses in English, Mathematics, Statistics, Economics, Business Law, and Accounting.

Before registering for any upper division FRL courses, FRL majors must have earned a grade of "C" (2.0) or better in each of the following lower division courses:

ENG 104
EC 201
ACC 224 and 225
STA 120
FRL 201

In addition, before registering for any upper division FRL courses FRL majors are encouraged to earn a grade of "C" (2.0) or better in the following courses:

ENG 105
MAT 125
EC 202
FRL 106

CORE COURSES IN MAJOR*

Required of all Business Majors**

Legal Environment of Business Tran.	FRL	201	(4)
Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
Principles of Management	MHR	301	(4)
Principles of Marketing Mgmt.	MKT	301	(4)
Intro to Financial Mgmt I.	FRL	304	(4)
Management Information Systems	CIS	310	(4)
Managerial Statistics	OM	314	(4)
Production & Operations Mgmt I.	OM	331	(4)
Management Policies & Systems	MHR	410	(4)
or Management Policies & Systems	OM	411	

FRL REQUIRED COURSES

R. E. Principles	FRL	106	(4)
Intro. to Fin. Mgmt. II	FRL	305	(4)
Invest. Analysis	FRL	330	(4)
Bus. For. & Fin. Pln.	FRL	363	(4)
Fin. Institutions	FRL	430	(4)
Eval. of Fin. Pol.	FRL	440	(4)
Undergrad Seminar	FRL	463	(2)

REQUIRED SPECIALTY (Choose one)

Finance Specialty

Legal Env Bus Org	FRL	302	(4)

*A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

** Microcomputer proficiency must be demonstrated by passing skills test or CIS 101 Introduction to Microcomputing.

Corp. Fin. Theory	FRL	367	(4)
Multin'tl Fin. Mgmt.	FRL	453	(4)
Real Estate Specialty			
R.E. Appr. Theory	FRL	380	(4)
R.E. Finance	FRL	383	(4)
R.E. Law	FRL	384	(4)
Bus Law and Contract Management			
Legal Env. Bus. Org.	FRL	302	(4)
Contract Admin.	FRL	325	(4)
Govt. Reg. of Bus.	FRL	401	(4)

Other Courses to Complete Major

Select 16 units from GROUP A 16
Select 8 units from GROUP B 8

GROUP A: (16 units)

Legal Env. Bus. Org.	FRL	302	(4)
Contract Admin.	FRL	325	(4)
Con. Asp. Unif. Com. Code	FRL	326	(4)
Con. Case Study	FRL	327	(4)
Con. Cost/Price	FRL	328	(4)
Int'l Financial Mkts	FRL	353	(4)
Corp. Finance Theory	FRL	367	(4)
R.E. Appr. Theory	FRL	380	(4)
R.E. Econ. & Inst.	FRL	381	(4)
R.E. Finance	FRL	383	(4)
R.E. Law	FRL	384	(4)
R.E. Practices	FRL	385	(4)
R.E. Prop. Mgmt	FRL	386	(4)
Gov. Reg. of Bus.	FRL	401	(4)
Leg. Impl. of Fin. Trans.	FRL	403	(4)
Leg. Env. of Lab. Rel.	FRL	406	(4)
Entrepreneurial Law	FRL	407	(4)
Leg. Env. Mktg.	FRL	419	(4)
Fin. Sml. Bus.	FRL	420	(4)
Leg. Asp. of Intl. Bus.	FRL	426	(4)
Sec. Opts.	FRL	431	(4)
Fut. Mkts Fin. Inst. & Com.	FRL	432	(4)
Sem. in Port Mgmt. & Cap. Mkts.	FRL	433	(4)
Intern in Fin.	FRL	441-442	(1-4) (1-4)
Multi Nat'l Fin Mgmt.	FRL	453	(4)
Commercial Banking	FRL	460	(4)
Sen. Project	FRL	461-462	(2) (2)
Financial Simulation	FRL	467	(4)
Risk Mgt. & Insurance	FRL	470	(4)
R.E. Mkt. Anal.	FRL	483	(4)
R.E. Invest. Anal.	FRL	486	(4)
Urban Land Dev.	FRL	490	(4)

GROUP B: (8 units)

Fin Stmt Anal	ACC	226	(4)
Personal Tax and Planning	ACC	231	(4)
Intermed Acctg	ACC	301	(4)
Intermed Acctg	ACC	302	(4)
Intermed Acctg	ACC	303	(4)
Managerial Acctg	ACC	310	(4)
or Cost Acctg	ACC	300	
Mang Acctg and Budget	ACC	412	(4)
Managerial Computing	CIS	211	(4)
Taxation of R.E. Trans	ACC	436	(4)
Policy for Int'l Mgmt	MHR	422	(4)
Intermed Micro Theory	EC	401	(4)
Intermed Macro Theory	EC	403	(4)
Intl Trade Theory	EC	404	(4)
Intl Finance	EC	405	(4)
Intro to Math Econ.	EC	406	(4)
Public Finance	EC	410	(4)
Comp Econ System	EC	412	(4)
Econ History Europe	EC	413	(4)
Labor Econ	EC	414	(4)
Land Econ	EC	419	(4)
Managerial Econ.	EC	424	(4)
Urban Econ.	EC	432	(4)
Business Logistics	MKT	309	(4)
Int'l Marketing Mgmt.	MKT	414	(4)
Mgmt Science I.	OM	315	(4)
Decision Support Systems	OM	350	(4)
Simulation for Bus Anal	OM	419	(4)
Purchasing Mgmt	OM	434	(4)
Quality Mgmt	OM	435	(4)
Project Mgmt	OM	436	(4)
Prin Urban Plan	URP	301	(4)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Intro Calculus for Business	MAT	125	(4)
Principles of Economics.	EC	202	(4)
Other electives to exclude business, economics or public administration			(8)
Unrestricted electives			(8)

GENERAL EDUCATION

(Required of all students)

Advocacy and Argument	COM	204	(4)
Amer Civilization	AMC	201	
or Intro Amer Govt	PLS	201	(4)
Amer Civilization	AMC	202	
or U.S. History	HST	202	(4)
Group Discussion	COM	337	(4)
Commun Prob Anal	COM	321	(4)
Elementary Statistics w/Appl	STA	120	(4)
Ethics	PHL	204	(4)
or Business Ethics	PHL	205	
Freshman English I	ENG	104	(4)
Freshman English II	ENG	105	(4)
General Psychology	PSY	201	(4)
Interpersonal Compt	MHR	318	(4)
Principles of Economics.	EC	201	(4)
Additional Units of General Education (See Advisor)			(24)

The following three minors are offered to both non-FRL majors and to FRL majors to develop marketable knowledge and skills. Please contact the minor coordinator for more information.

MINOR IN REAL ESTATE

This minor prepares the student for a real estate career and for the real estate brokers examination course requirements. The minor requires 24 units (six classes) for Business majors and up to 44 units (eleven classes) for non-Business majors.

Required:

Principles of Econ.	EC	201	(4)
Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
R. E. Prin. & Prac.	FRL	106	(4)
Leg. Env. of Bus. Transactions.	FRL	201	(4)
Introduction to Fin Mgmt I	FRL	304	(4)
R. E. Appraisal.	FRL	380	(4)
R. E. Finance	FRL	383	(4)
R. E. Law	FRL	384	(4)
R.E. Practices	FRL	385	(4)

Select 8 units from the following:

R. E. Economics and Institutions	FRL	381	(4)
Real Prop. Mgmt.	FRL	386	(4)
R. E. Mkt. Analysis	FRL	483	(4)
R. E. Inv. Analysis	FRL	486	(4)
Urban Land Development	FRL	490	(4)

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	384	(4)
Legal Environment of Marketing (MKT 302 or Consent)*	FRL	419	(4)
Legal Implications of Financial Transactions	FRL	403	(4)
Contract Administration	FRL	325	(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 304, OM 314, 331, 332, STA 120.

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 * (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)

Study of the adversary system, principles of American law, in depth coverage of business related torts and contracts, Uniform Commercial Code with emphasis on the law of sales, product liability, and real and personal property. Case analysis. 4 lecture-presentations. Prerequisite: ENG 104.

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.

FRL 302 Legal Environment of Business Organizations (4)

An analysis of the legal requirements of formation, operation and financing of partnerships, corporations and other business organizations. Consideration of the agency relationships and responsibilities of involved parties. Discussion of the economic, political and regulatory environment. Case analysis. 4 lecture/problem-solving. Prerequisite: FRL 201 or consent of instructor.

FRL 304 Introduction to Financial Management I (4)

This is the first of a two-course sequence for Accounting and Finance 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/problem-solving. Prerequisite: ACC 225, EC 201 and STA 120.

*Satisfies educational requirement for Real Estate Broker's License.

FRL 305 Introduction to Financial Management II (4)

This is the second of the two-course sequence starting with FRL 304. Topics include valuation sources of financing, cost of capital, leverage, capital structure, dividend policies, and international financial management. 4 lecture/problem-solving. Prerequisite: FRL 304, and microcomputer proficiency.

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. 4 lecture/problem-solving. Prerequisites: FRL 201, FRL 304, or consent of instructor.

FRL 326 Contract Aspects of the Uniform Commercial Code (4)

Provide transition from common law background to statutory contract law. Formation of sales contract under the UCC. Insight regarding policy considerations, legal remedies and the mechanical requirements. 4 lecture-problem-solving. Prerequisite: FRL 201, or consent of instructor.

FRL 327 Contract Case Study/Practical Application (4)

Review of current and past cases in government and private contracting, using the case study method. Combined class textbook and library assignments. Cases, selected by areas briefed, discussed and reviewed. 4 lecture problem-solving. Prerequisites: FRL 201 and FRL 304, or consent of instructor.

FRL 328 Contract Cost/Price Techniques-Negotiation (4)

Provide understanding of cost/price techniques applicable to public and private prime/sub contracts including RFQ-RFP-IFB analysis, proposal preparation, estimating methodology, and pricing strategies. Familiarize with analytical and econometric techniques in preparing contracts. 4 lecture /problem-solving. Prerequisites: FRL 201 and FRL 304, or consent of instructor.

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/problems. Prerequisite: FRL 305, and EC 202.

FRL 353 International Financial Markets (4)

Institutional overview of structure, and application function of international financial markets and their applications. International financial systems, capital flows, foreign exchange risk measurement and management, Eurocurrency markets, Asian currency markets, international capital markets, international banking, international debt crisis, and export-import financing. 4 lecture/problem-solving. Prerequisite: FRL 304.

FRL 363 Business Forecasting and Financial Planning (4)

Use of different forecasting techniques as they relate to finance and real estate issues. Smoothing methods, decomposition methods, correlation analysis, regression analysis, seasonal models, Box-Jenkins methodology, and managing the forecasting process. Use of microcomputer to aid calculations. Individual projects. 4 lecture/problem-solving. Prerequisites: FRL 305, OM 314, and MAT 125.

FRL 367 Corporate Finance Theory (4)

Capital budgeting under uncertainty, capital structure, cost of capital, and specialized financial decision tools. Emphasis on operational techniques through cases, problems and computer applications. 4 lecture/problem-solving. Prerequisites: FRL 305 and FRL 363.

FRL 380 Real Estate Appraisal Theory (4)

An analysis of various approaches to value as applied to all real property, emphasizing urban properties. A survey of value theory related to practical applications, using specific problem solving via the preparation of reports concerning residential and investment properties. 4 lecture-discussion. Prerequisites: FRL 106 or consent of instructor, and FRL 201.

FRL 381 Real Estate Economics and Institutions * (4)

An analysis of the economies of real estate markets, developments and operations. Investigation of the foundations of institutions that operate in the areas of real estate marketing, financing, development and research. 4 lectures. Prerequisite: 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. Case analysis. 4 lecture/problem-solving. Prerequisites: FRL 106 and FRL 304, or consent of instructor.

FRL 384 Real Estate Law * (4)

Rights and liabilities surrounding the acquisition, possession and transfer of real property: easements, deeds, zoning, mortgages, foreclosure, landlord and tenant relationships. 4 lecture-discussion. Prerequisites: FRL 380 and FRL 201, or consent of instructor.

FRL 385 Real Estate Practices * (4)

Ethical and legal responsibilities of the real estate broker: listing agreements, structuring of transaction and escrow requirements. Analysis of common agreements, documents and disclosure statements. 4 lecture-discussion. Prerequisite: FRL 380.

FRL 386 Real Property Management (4)

General practices and legal aspects of property management. Establishing rental schedules, tenant billing, rent collection, lease clauses, lease negotiations, purchasing procedures related to repairs and maintenance, and property management accounts for apartments, office buildings, industrial properties and shopping centers. 4 lecture-discussion. Prerequisites: FRL 106 or FRL 380, and ACC 225.

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. May be taken on a CR/NC basis.

FRL 401 Government Regulation of Business (4)

The study of the regulation of business, government. Antitrust, trade regulation, labor and employment law, privacy, safety, environmental and consumer legislation. 4 lecture/problem-solving. Prerequisite: FRL 201.

FRL 403 Legal Implications of Financial Transactions (4)

An analysis of the legal structure, rationale and implication of commercial transactions involving secured transactions, negotiable instruments and credit. 4 lectures. Prerequisite: FRL 201, or consent of instructor.

FRL 406 Legal Environment of Labor Relations (4)

A study of the history and application of labor and employment law in the United States. Topics include legal rights and remedies available to labor unions, employees and management. 4 lectures. Prerequisite: FRL 201.

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. Prerequisite: 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 201, MKT 302, or permission of instructor.

FRL 420 Financing Small Business (4)

Special financial problems of the entrepreneur, small firm and venture capital investor. Preparation of a loan proposal. Student presentation and group analysis of case problems. 4 lecture-presentations. Prerequisite: FRL 305.

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 201.

FRL 430 Financial Institutions (4)

Focus on financial markets and institutional management from a macroeconomics perspective. Study of the relationship between financial institutions and financial markets and the impact of government regulation and monetary policy. 4 lecture/problem-solving. Prerequisite: FRL 305 and EC 202.

FRL 431 Security Options (4)

Options market and the mechanics of options investing. Valuation models, conservative and aggressive strategies for different market environments, and their risk-reward characteristics, portfolio management, and computer simulation. 4 lecture/problem-solving. Prerequisite: FRL 330 or consent of instructor.

FRL 432 Futures Markets: Financial Instruments and Commodities (4)

Futures contracts on financial instruments such as government bonds, commercial paper, GNMA, foreign currencies and market index futures contracts. Trading aspects and future markets of agricultural and industrial commodities. 4 lecture/problem-solving. Prerequisite: FRL 330, 363, or consent of instructor.

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 seminar-discussion. Prerequisites: FRL 330, FRL 363, FRL 431, FRL 432, or consent of instructor.

FRL 440 Evaluation of Financial Policy (4)

A seminar course in finance utilizing comprehensive cases to stimulate the role of the financial manager. 4 seminar-discussion. Prerequisite: FRL 305.

FRL 441, 442 Internship in Finance (1–4) (1–4)

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. Total credit limited to eight units in both classes. Prerequisite: permission of the FRL coordinator of internships.

FRL 453 Multinational Financial Management (4)

Foreign exchange markets, foreign exchange risk management, multinational working capital management, foreign investment analysis and multinational capital budgeting, international diversification, cost of capital and capital structure of the multinational firm, political risk management, and international taxation. 4 lecture/problem-solving. Prerequisite: 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. Prerequisite: senior standing and permission of instructor. 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 467 Financial Simulation (4)

Financial modeling techniques and analysis using electronic spreadsheets. Emphasis on corporate financial management: capital budgeting, debt capacity, financial planning, credit management. Case discussion. Individual projects. 4 lecture/problem-solving. Prerequisite: FRL 367.

FRL 470 Risk Management and Insurance (4)

Insurance and risk management for corporations, government and individuals. Applicatiion of risk retention, loss control and insurance methods to life, health, liability and property risks. Social insurance, auto and workers compensation, employment benefits and pensions. 4 lecture/problem-solving. Prerequisites: FRL 304, OM 314, or consent of instructor.

FRL 483 Real Estate Market Analysis * (4)

Analyze and collect urban economic and real estate data to prepare market demand studies for use in real estate investment analysis and feasibility studies for development projects. 4 lecture/problem-solving. Prerequisite: FRL 280.

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. 4 lecture/problem-solving. Prerequisites: FRL 106 and FRL 383, or consent of instructor.

FRL 490 Urban Land Development * (4)

A review of the processes for developing real properties, emphasizing site selection techniques, land purchasing procedures, methods of conducting feasibility studies, including market studies, financial analysis and building design. 4 lecture/problem-solving. Prerequisite: FRL 381, and FRL 483 or 486; or consent of instructor.

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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* Satisfies educational requirement for Real Estate Broker's License.

INTERNATIONAL BUSINESS

Gerald Rogers, *Coordinator*
Anwar Y. Salimi, *Accounting*
Hyung K. Jin, *Finance*
Mansour Sharifzadeh, *Management and Human Resources*
Mostafa El Agizi, *Operations Management*
Koichiro R. Isshiki, *Computer Information Systems*
Gregory Young, *Law*
James Hill, *Marketing*

This major provides students with a sound background in business and management as well as providing interdisciplinary specialization in international business. The objectives of the major are twofold: to provide students with the business knowledge and skills essential for careers in international business, and to provide them with an understanding and appreciation of the culture, language, economics, politics and history of other parts of the world, with particular emphasis upon a geographic area in which the student has a special career interest. The curriculum requires completion of the business core which provides to all business majors a solid foundation in the theory and practice of modern business management. In addition, the International Business major requires completion of a minor in a functional area of business (eg accounting, finance, management, etc.) or, as an alternative to a minor in business, a concentration in International Studies directed electives or foreign language. Each student completes a specialization in a geographic area of the world, and must demonstrate proficiency in a related foreign language. Each student is expected to complete at least two quarters of practical experience in international business through the internship program.

Each student should work closely with the program advisor in identifying career goals and selecting course work most appropriate for goal attainment. The International Business major involves the completion of requirements in each of the following seven areas:

1. Core Courses in Major required of all Business majors
2. International Business required courses
3. Support and Elective courses
4. Functional Specialization
5. Regional Area of Emphasis directed electives
6. General Education
7. Foreign Language

CORE COURSES IN MAJOR*

Required of All Business Majors**

Legal Environ of Business Transactions	FRL	201	(4)
Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
Management Information Systems	CIS	310	(4)
Principles of Management	MHR	301	(4)
Principles of Marketing Management	MKT	301	(4)
Introduction to Financial Management I	FRL	304	(4)
Managerial Statistics	OM	314	(4)
Production and Operations Management	OM	331	(4)
Management Policies and Systems	MHR	410	(4)
OR Management Policies and Systems	OM	411	

Required for International Business

Introduction to International Business	MHR	322	(4)
Principles of Economics	EC	202	(4)
International Trade Theory and Policy	EC	404	(4)
Economic Geography	GEO	312	(4)
International Marketing	MKT	414	(4)
Legal Aspects of International Business	FRL	426	(4)
Assessing International Business Environments	MHR	332	(4)
† Internship in International Business	MHR	441	(4)
† Internship in International Business	MHR	442	(4)

*A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

** Microcomputer proficiency must be demonstrated by passing skills test or CIS 101 Introduction to Microcomputing.

SUPPORT COURSES

Select 8 units from:

International Accounting	ACC	499	(4)
Intro to Financial Management II	FRL	305	(4)
International Financial Markets	FRL	353	(4)
Strategy in International Marketing	MKT-	415	(4)
Policy for International Management	MHR	422	(4)
Case Studies in International Operations Management	OM	456	(4)

FUNCTIONAL SPECIALIZATION

Students must complete a minimum of 20 units:

A. Business Area Minor

or B. International Studies Directed Electives

or C. Minor in a Foreign Language

† The eight (8) units of Internship may be taken in any department but must be in a job approved by the Program Advisor and be directly related to the student's international business career goal. A Senior Project (461 and 462) in International Business, approved by the Program Advisor, may be substituted for Internship in circumstances of extensive previous work experience or individual needs.

A. Business Area Minor

Students will complete a minor in one of the business areas: Accounting; Computer Information Systems; Finance, Real Estate and Law; Marketing; Management and Human Resources; or Operations Management.

B. International Studies Directed Electives

Students will complete 20 units of International Studies Directed Electives selected *with the approval of the Program Advisor* from the list that follows. Courses taken to satisfy the General Education, Category VII-upper division course requirements may *not* be applied as International Studies Directed Electives. Note that through selection of course work it is possible to specialize in such areas as foreign language, international agriculture, international relations, anthropology, or international development.

California and World Agriculture	ABM	300	(4)
Introduction to Cultural Anthropology	ANT	102	(4)
Human Nature/Human Affairs-Bicult View	ANT	201	(4)
Environment, Technology and Culture	ANT	350	(4)
Development Anthropology	ANT	352	(4)
Psychological Anthropology	ANT	355	(4)
Social Anthropology	ANT	358	(4)
Cultural Areas of the World	ANT	399	(4)
Distrib of Inc and Factor Pricing	EC	402	(4)
Intermed Macroeconomic Theory	EC	403	(4)
Cultural Geography	GEO	102	(4)
International Travel	HRT	415	(4)
History of Modern Nation States	HST	399	(4)
Instit for Intnl Agric Trade and Dev	IA	301	(4)
Agricultural Market Development	IA	302	(4)
Agric Policy in Developing Nations	IA	362	(4)
Rural Community Development	IA	382	(4)
Political Development	PLS	342	(4)
International Relations	PLS	452	(4)
Foreign Relations of the United States	PLS	455	(4)
International Law	PLS	456	(4)
Population and Society	SOC	330	(4)
Language courses beyond the Intermediate Level proficiency requirement as approved by Advisor. (4–20)			

C. Students will complete a minor in a foreign language appropriate to their geographic area of specialization.

REGIONAL AREA OF EMPHASIS DIRECTED ELECTIVES

Students must elect a Regional Area of Emphasis from one of those below and take 12 units from that area. Additional courses (eg HST 399 History of Modern Nation States) may be used to supplement the following lists with the approval of the Program Advisor. The regional area of emphasis must be coordinated with the foreign language requirement.

Africa

Geography of Africa	GEO	358	(4)
Pre-colonial Africa	HST	331	(4)
Colonial Africa	HST	332	(4)
African Nationalism & Decolonization	HST	333	(4)

Asia

Geography of Asia	GEO	357	(4)
East Asia to 1800	HST	301	(4)
East Asia in 19th Century	HST	302	(4)
East Asia in 20th Century	HST	303	(4)
India and South Asia	HST	305	(4)
Southeast Asia	HST	309	(4)
China Since 1949	HST	365	(4)
World Religions: Oriental	PHL	210	(4)
Philosophy & Relig of Japan	PHL	401	(4)
Philosophy & Relig of China	PHL	402	(4)
Philosophy & Relig of India	PHL	403	(4)
Chinese Government and Politics	PLS	443	(4)
Asian Governments and Politics	PLS	445	(4)

Europe

Economic History of Europe	EC	413	(4)
Spanish Civilization	FL	352	(4)
Sovient Union: Environment and People	GEO	353	(4)
Europe: Land and People	GEO	359	(4)
Nationalism, Imp and Ind: 1850-1914	HST	325	(4)
Europe in the 20th Century	HST	326	(4)
Eastern Europe	HST	354	(4)
The Soviet Union	HST	356	(4)
Great Britain in the Industrial Rev	HST	425	(4)
World Relig: Mediterranean World	PHL	211	(4)
Marxism	PLS	435	(4)
European Governments and Politics	PLS	441	(4)
Soviet Government and Politics	PLS	447	(4)

Latin America

Latin American Civilization	FL	353	(4)
Contemp Latin American Civilization	FL	354	(4)
Geography of Latin America	GEO	352	(4)
Latin America: Colonial Period	HST	335	(4)
Latin America: Era of Nation Bldg	HST	336	(4)
Latin America: Prob of 20th Century	HST	337	(4)
Brazil	HST	361	(4)
Mexico	HST	362	(4)
Latin American Governments and Politics	PLS	444	(4)
U.S.-Latin American Relations	PLS	454	(4)

Middle East

Cultural Areas of the World	ANT	399	(4)
Middle East: Rise of Islam	HST	313	(4)
Middle East: Ottoman Empire	HST	314	(4)
Middle East: The 20th Century	HST	315	(4)
World Religions: Mediterranean World	PHL	211	(4)
Middle Eastern Governments and Politics	PLS	446	(4)
SubSaharan African Govts and Politics	PLS	442	(4)

GENERAL EDUCATION

The student must complete 72 units to fulfill the requirements for General Education. Among the General Education courses required are the following:

Freshman English I	ENG 104 (4)	Cat I (a)
Statistics with Applications	STA 120 (4)	Cat II (a)
Principles of Economics	EC 201 (4)	Cat IV (a)
Org Behav in Multi-Cult Envir	MHR 318 (4)	Cat IV (b)
OR Indust/Personnel Psych	PSY 332	
American Civilization	AMC 201 (4)	Category VI
OR Intro to Amer Govt	PLS 201	
American Civilization	AMC 202 (4)	Category VI
OR U.S. History	HST 202	

FOREIGN LANGUAGE (Proficiency)

The student must demonstrate proficiency in a foreign language from that part of the world in which he or she has a career interest. The required level of proficiency is Intermediate Level as defined by the American Council on the Teaching of Foreign Languages (ACTFL). Ordinarily this level of proficiency is obtained in one year of language study beyond the CSU entry level requirements (Elementary Level proficiency). Four (4) units of course work in a foreign language can be used to fulfill the General Education, Category IIIc requirement. A proficiency examination must be passed even if course work is taken.

COURSE DESCRIPTION

For a complete description of each of the courses in this major, please refer to the catalog listings under the appropriate departments.

MANAGEMENT AND HUMAN RESOURCES

Gene Houser, *Chair*

Forrest F. Aven, Jr.
John C. Bruckman
Leon A. Dale
John T. Fleishans, III
Lady A. Hanson
Kathleen Harcharik
Stephen Iman
Carol Jones
Thomas Patten, Jr.
John Pfaff
Reed M. Powell
William Relf
Jerry Rogers
R. Richard Sabo
Shiori Sakamoto
Mansour Sharifzadeh
Shanthi Srinivas
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 and information 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. Human Resources or 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 School of Education advisor.

CORE COURSES FOR MAJOR*

Required of all Business Majors**

Legal Environment of Business Trans.	FRL	201	(4)
Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
Principles of Management	MHR	301	(4)
Principles of Marketing Mgmt.	MKT	301	(4)
Intro to Financial Mgmt I.	FRL	304	(4)
Mgmt Info Systems	CIS	310	(4)
Managerial Statistics	OM	314	(4)
Production & Operations Mgmt I.	OM	331	(4)
Management Policies & Systems	MHR	410	(4)
or Management Policies & Systems	OM	411	

MHR Required Courses

Entrepreneurship and Intrapreneurship	MHR	306	(4)
Human Resources Management	MHR	311	(4)
Organizational Behavior	MHR	318	(4)
Communication for Management	MHR	324	(4)
Emerging Issues in Mgmt.	MHR	452	(4)
Select four (4) units from:			
Internship in Bus Mgt	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)

*A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

**Microcomputer proficiency must be demonstrated by passing skills test or CIS 101 Introduction to Microcomputing.

OTHER COURSES TO COMPLETE MAJOR

One career-goal elective program selected with approval of advisor .....(36)

SUPPORT COURSES

Non-Business courses in support of career-goal elective program, selected with approval of advisor .....(12)

General Education

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

Freshman English I	ENG	104	(4)
One course			(4)
One course			(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)

A. Principles of Economics	EC	201	(4)
B. One course			(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 (12 units). A university-approved package with consent of advisor.

Unrestricted Electives ..... (14)

All students are required to show proficiency in keyboarding or take MHR 144.

Students with previous skills in keyboarding should contact the MHR lab 9-201.

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 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. Students should formally enroll in the minor before taking any courses in the minor. See Department Chair for details.

Minor in Administrative Management

(This minor provides non-MHR majors with an orientation in the operation of a business office.)

Financial Accounting	ACC	224	(4)
Microcomp Applic for Mgrs	MHR	221	(2)
Communication for Mgt	MHR	324	(4)
Admin. Systems & Technologies	MHR	302	(4)
Admin/Facilities Systems Dev	MHR	402	(4)

Electives (College of Business Administration courses, may include EC 201 or EC 202) ..... (16)

Minor in Human Resources Management

(This minor provides non-MHR students with an opportunity to develop their capability to manage other employees and with introductory background in the human resource/personnel field.)

Human Resources Management	MHR	311	(4)
Organizational Behavior	MHR	318	(4)
Employee Compensation Plans	MHR	413	(4)
Training and Development	MHR	405	(4)

and two courses from the following list:

Managing Career Development	MHR	412	(4)
Human Resource Information Mgmt	MHR	415	(4)
Management Union Relations	MHR	421	(4)
Advanced Organizational Behavior	MHR	438	(4)

Electives (College of Business Administration courses, may include EC 201 or EC 202) ..... (12)

Minor in Small Business Management

(This minor is to provide non-MHR majors with an introductory background needed to start and operate a small business.)

Financial Accounting	ACC	224	(4)
Legal Environment of Business Trans.	FRL	201	(4)
Principles of Management	MHR	301	(4)
Entrepreneurship and Intrepreneurship	MHR	306	(4)
Problems of Small Business	MHR	308	(4)
Seminar in New Venture Creation	MHR	408	(4)
Principles of Marketing	MKT	301	(4)
Entrepreneurship: the Bus Plan	MHR	414	(4)

Electives (College of Business Administration courses, may include EC 201 or EC 202) ..... (4)

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 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 Microcomputer Applications for Managers (2)

The use of integrated productivity software to solve problems representative of small business, human resources and administrative management. Exercises employ word processing, spreadsheet, and database management. 4 one-hour activity periods. Prerequisites: MHR 144 or keyboarding proficiency.

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 301 Principles of Management (4)

Survey of the history of management and review of significant management literature. Applications of management theories to practical problems in planning, organizing, and controlling business activity. 4 lecture-discussions.

MHR 302 Administrative Systems and Technologies (4)

An overview of administrative systems—technology, people and procedures—and how they are used to improve the organization's productivity. Solving administrative problems in information creation, storage, retrieval, manipulation and distribution. Office ergonomics and space management. 4 lecture-presentations.

MHR 306 Entrepreneurship and Intrapreneurship (4)

Examination of the role, characteristics and sacrifices of the entrepreneur, requirements of entrepreneurship, and philosophical bases for entrepreneurship from a global perspective. Comparative study of entrepreneurship and intrapreneurship. 4 lecture discussions.

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 224; MHR 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. Case studies. 4 lecture-discussions. Prerequisite: MHR 301 or permission of instructor.

MHR 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/problem solving, case studies and group activities.

MHR 318 Organizational Behavior in a Multi-Cultural Environment (4)

Introductory experiences in the basics of organizational behavior. Socialization, learning, motivation, perception, personality, communications, leadership, power, conflict, group dynamics, problem-solving, and decision making as they apply to the manager in a multi-cultural economic and political environment. 4 lecture-discussions. Prerequisites: PSY 201 or equivalent, upper division status, or permission of instructor.

MHR 319 Management of Not-for-Profit Organizations (4)

Methods, theory and institutional knowledge for managing not-for-profit organizations. Problems and issues in policy, organization, program, personnel and budget unique to not-for-profit organizations. 4 lecture-discussions. Prerequisite: MHR 318 or permission of instructor.

MHR 322 Introduction to International Business (4)

Introduction to international business, trade and foreign investment. Survey of cultural, political, social, and economic aspects of doing business abroad. Theories of international trade and economic development. 4 lecture-discussions.

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 lecture/problem-solving. Prerequisite: ENG 104 or permission of instructor.

MHR 332 Assessing International Business Environments (4)

Analysis of cultural, political, social and economic aspects of doing business abroad. Study and applicatiion of methods in conducting risk vs. opportunity analysis of countries, investments, projects and trade. Case studies, student research projects and presentations. 4 lecture/problem-solving. Prerequisite: MHR 322 or consent 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 402 Administrative/Facilities Systems Development (4)

Planning, design and implementation of administrative systems and technologies through office simulations using the microcomputer. Analysis of facilities requirements and facilities management. Emphasis on employee and work-group interaction. 4 lecture/problem-solving. Prerequisites: MHR 221, MHR'302 or consent of instructor.

MHR 403 Dynamics of Leadership for Business Educators (4)

Prepares the teaching candidate for professional roles in the school environment. Leadership styles and techniques for working effectively with parents, administration, governmental agencies and community groups. Application exercises in real and simulated settings. 4 lecture/problem-solving.

MHR 405 Training and Development (4)

Theory and applications of employee training and development. How rapid changes in technology, market conditions, and business practices make training a growing management function. Topics include determining training needs, selecting methods, planning programs and evaluating results. 4 lecture/problem-solving.

MHR 406 Strategies for Men and Women in Management (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. 4 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 teaching/learning processes in business education courses. Topics include instructional objectives, competency-based education, evaluation, and individualized instruction. Use and evaluation of business education software and instructional modules. 2 lecture/problem-solving, one 2-hour activity.

MHR 410 Management Policies and Systems (4)

Seminar in the application and development of policy matters for general management. A capstone experience utilizing case problem analysis which involve the integration of business functions and the employment of business analytic techniques. Special examination of organizational problems with the handicapped. 4 seminars. Prerequisite: Completion of College of Business Administration core requirements or consent of instructor.

MHR 412 Managing Career Development (4)

Career development issues such as the assessment of potential career tracks, transition from academia, career strategies and obstacles, personal and organizational value conflicts, dual career marriage and the prices of success. 4 lecture-presentations. Prerequisites: MHR 318 or permission of instructor.

MHR 413 Employee Compensation Plans (4)

The goals and external/internal organizational considerations that affect planning and administering compensation in organizations. Evaluation of race and sex discrimination in pay, and comparable job worth. Job evaluation, performance appraisal systems, and fringe benefits. 4 lecture-presentations. Prerequisite: MHR 311.

MHR 414 Entrepreneurship: The Business Plan (4)

Creation of detailed two to five year strategic business plan for entrepreneurial enterprises of small to medium size. 4 lecture problem solving. Prerequisites: FRL 304, MKT 301, MHR 408, and Senior Standing or Permission of Instructor.

MHR 415 Human Resource Information Management (4)

Emerging approaches to the management of human resources information in hiring, compensation/benefits, skills inventory, employee records, and training. Automated and manual systems compared. Student presentations on proposed and operational human resource information systems. Microcomputer exercises and simulations. 4 lecture/problem-solving. Prerequisite: MHR 311.

MHR 421 Management Union Relations (4)

Development of management-union relations in the United States: the continuously changing roles and relationships of labor, management, and government through collective bargaining, arbitration, and legislation. Review of trends affecting productivity and the labor place. 4 lecture-discussions. Prerequisite: Senior standing or consent of instructor.

MHR 422 Policy for International Management (4)

Seminar in the application and development of policy for international business management. Analysis of international management practices and problems utilizing the case study approach. 4 seminar discussions. Prerequisite: MHR 322 or consent of instructor.

MHR 424 Advanced Management Communications Seminar (4)

Skill training in adapting to the interpersonal environment of the organization. Topics include setting behavioral goals, letting oneself be known, listening and responding, challenging and participating effectively in work groups. Primary activities are student discussions and practice of the skills. 4 seminars. Prerequisites: MHR 318 or MHR 324 or consent of instructor.

MHR 438 Advanced Organizational Behavior (4)

Application of human processes used to achieve goals in the organization. Group experiences whereby students gain insights to their own leadership styles, integrate their styles with managerial functions and the organization. Case studies, problem-solving exercises and complex organizational simulations. 4 lecture/problem-solving. Prerequisite: MHR 318 or PLS 316 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 useful 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 societal environment. Issues include business statesmanship, industrial democracy, international problems, comparative management, automation, managing for the future, natural resources and human freedom. Student presentations and discussions. 4 lecture presentation. Prerequisite: Senior standing or permission of instructor.

MHR 461, 462 Senior Project (2) (2)

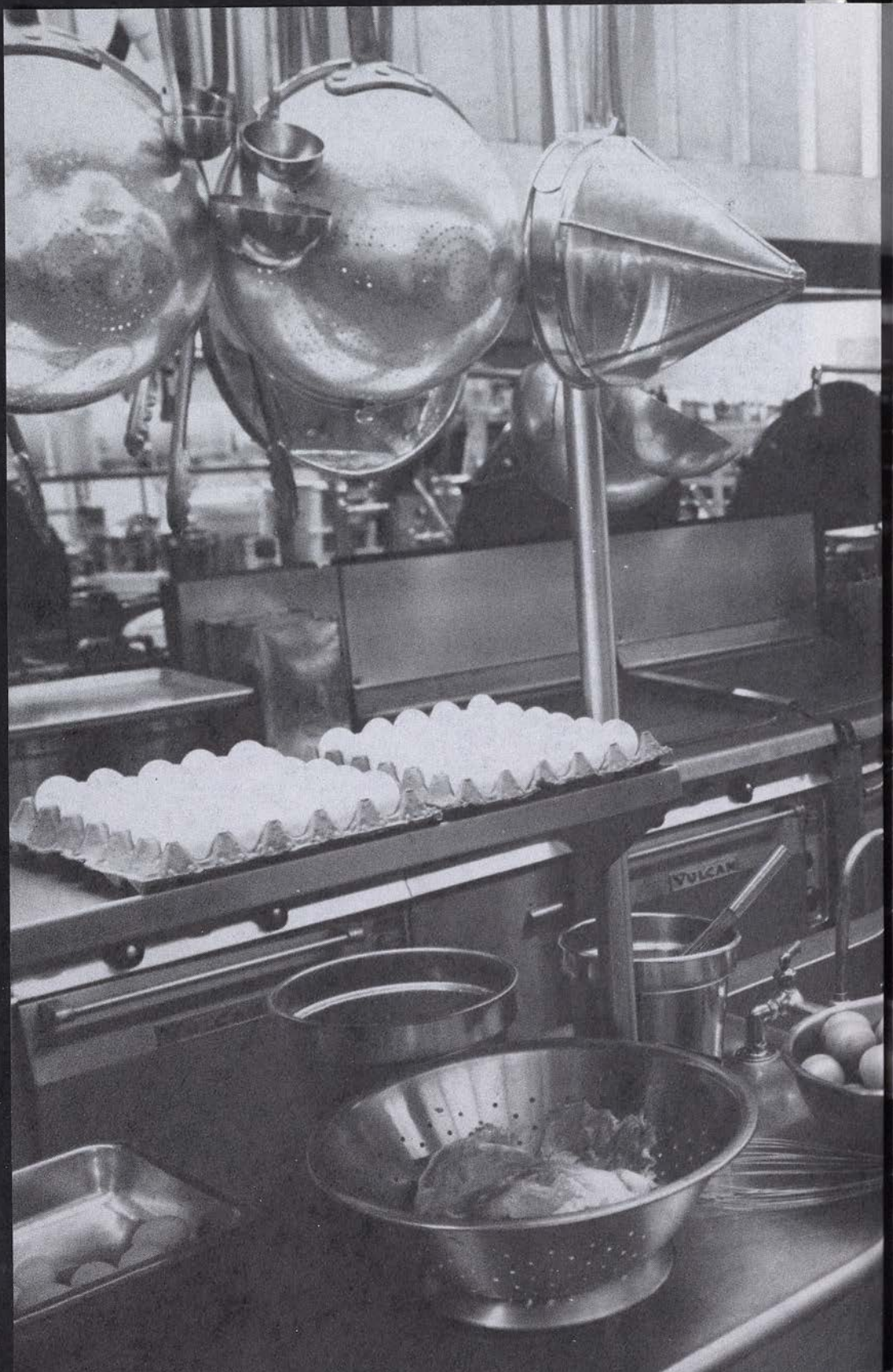
Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in their fields of employment. Formal report is required. Prerequisite: Senior standing. Required minimum of 120 hours.

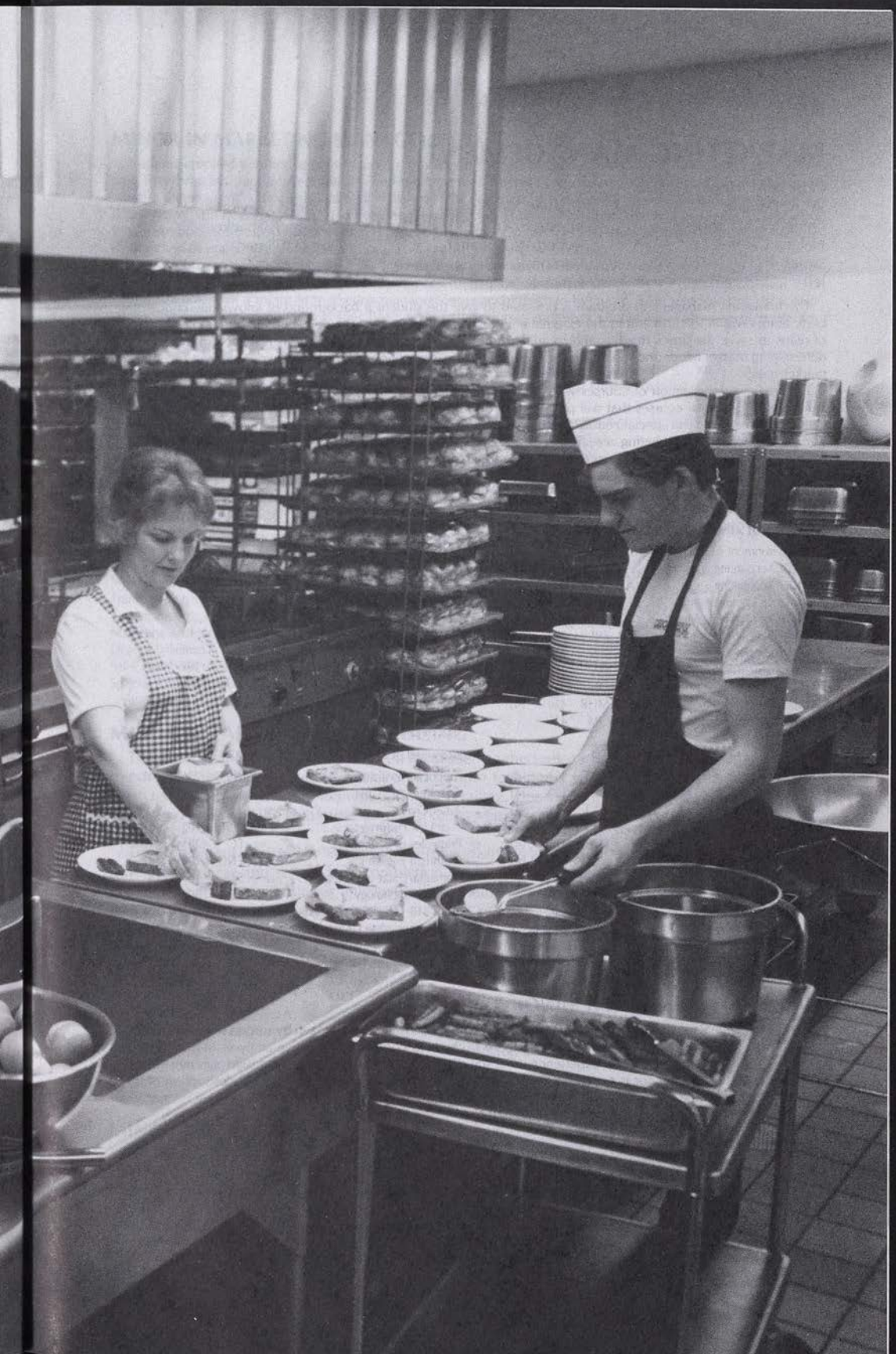
MHR 463 Undergraduate Seminar (2)

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.


VULCAN



MARKETING MANAGEMENT

Patricia M. Hopkins, *Chair*
W. R. Berdine
Frederick L. Capossela
Helena Czepiec
James. R. Hill
Jerry L. Kirkpatrick
Sharyne Merritt
Juanita P. Roxas
Robert W. Schaffer
Vernon R. Stauble
James E. Swartz
Charles L. Taylor
Andrew J. Thacker
Donna Tillman
Ravi Tripuraneni

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, (6) transportation and distribution management, (7) product/brand management, and (8) industrial marketing.

CORE COURSES IN MAJOR*

Required of all Business Majors**

Legal Environment of Business Trans	FRL	201	(4)
Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
Principles of Management	MHR	301	(4)
Principles of Marketing Mgmt.	MKT	301	(4)
Intro to Financial Mgmt I	FRL	304	(4)
Mgmt Info Systems	CIS	310	(4)
Managerial Statistics	OM	314	(4)
Production and Operations Mgmt I	OM	331	(4)
Management Policies and Systems	MHR	410	(4)
or Management Policies and Systems	OM	411	

MKT REQUIRED COURSES

Marketing Strategy	MKT	302	(4)
Marketing Analysis and Control	MKT	320	(4)
Marketing Research I	MKT	408	(4)
Marketing Research II	MKT	409	(4)
Buyer Behavior	MKT	411	(4)
Legal Environment of Marketing	FRL	419	(4)
Marketing Problems	MKT	421	(4)
Undergraduate Seminar	MKT	463	(2)
Plus a minimum of 38 units of courses (including 8 not in Business) with advisor approval			(38)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Introduction to Cultural Anthropology	ANT	102	(4)
or Principles of Sociology	SOC	201	
Unrestricted Electives			(14)

GENERAL EDUCATION

(Required of all students)

American Civilization	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)
Freshman English I	ENG	104	(4)
Elementary Stat with Appl	STA	120	(4)
General Psychology	PSY	201	(4)
MHR 318 (4) plus 8 upper division units			(12)
Units to complete General Education			(36)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

**Microcomputer proficiency must be demonstrated by passing a skills test or CIS 101 Introduction to Microcomputing.

QUANTITATIVE RESEARCH MINOR

The Quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Marketing. A full description of this minor is included in the "University Programs" section of this catalog.

MINOR IN MARKETING MANAGEMENT

Students enrolled in other academic programs, especially those outside of the College 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)
Marketing Strategy	MKT	302	(4)
Buyer Behavior	MKT	411	(4)
Financial Accounting	ACC	224	(4)
Principles of Economics	EC	201	(4)

Select 12 additional units from the following list of courses:

Professional Selling	MKT	208	(4)
Promotional Strategies	MKT	307	(4)
Retail Management	MKT	308	(4)
Business Logistics	MKT	309	(4)
Field Sales Management	MKT	310	(4)
Marketing of Services	MKT	316	(4)
Transportation Systems and Traffic Management	MKT	319	(4)
Marketing Analysis and Control	MKT	320	(4)
Direct Marketing	MKT	326	(4)
Sales Promotion	MKT	327	(4)
Special Problems for Upper Division Students	MKT	400	(2)
Product and Brand Management	MKT	402	(4)
Marketing for Small Business Organizations	MKT	404	(4)
Advertising Management	MKT	405	(4)
Industrial Marketing	MKT	407	(4)
Marketing Research I	MKT	408	(4)
Marketing Research II	MKT	409	(4)
International Marketing	MKT	414	(4)
Strategy in Int'l Mktg	MKT	415	(4)
Int'l Exporting	MKT	416	(4)
Legal Environment of Marketing	FRL	419	(4)
Marketing Problems	MKT	421	(4)
Management of Marketing Channels	MKT	431	(4)
Evaluating Adv Effectiveness	MKT	433	(4)
Advanced Prof Selling	MKT	435	(4)
Competitive Mktg Simulation	MKT	437	(4)
Logistics Strategy Planning, Decisions and Control	MKT	439	(4)
Retailing Problems	MKT	447	(4)
Industrial Mktg Problems	MKT	449	(4)

MINOR IN FASHION MERCHANDISING

This interdisciplinary minor is designed for students who seek careers in the fashion industry. The minor provides students with a background in both fashion as well as business to better prepare them to seek employment in manufacturing or retailing. The minor in Fashion Merchandising is administered jointly by the Departments of Marketing Management and Foods & Nutrition/Home Economics.

The attainment of a minor in fashion merchandising is accomplished by appropriate selection, timely scheduling and satisfactory completion of specifically designated courses and electives totaling a minimum of 36 quarter units as outlined below:

Completion of the following courses is required:

Art of Dress	HE	137	(4)
Fashion Merchandising	HE	474	(4)
Inst for Int Ag Trade & Dev	IA	301	(4)
Principles of Marketing Mgmt	MKT	301	(4)
Marketing Internship	MKT	441/2	(4)
Select two courses from Group A			(8)
Select two courses from Group B or C			(8)

GROUP A

Intro to Cloth Construction	HE	130	(4)
People, Culture, and Dress	HE	138	(4)
Visual Merch: Cloth and Int	HE	475	(4)

GROUP B

Professional Selling	MKT	208	(4)
Retail Management	MKT	308	(4)
Retailing Problems	MKT	447	(4)

GROUP C

Intro to International Bus	MHR	332	(4)
International Marketing Mgmt	MKT	414	(4)
Intl Mktg of Food & Fiber Products	IA/ABM	330	(4)
Strategy in Intl Marketing	MKT	415	(4)

MINOR IN LOGISTICS

Students from any major may participate in the Minor in Logistics. The Minor in Logistics, offered jointly by the Operations Management and Marketing Management Departments, is the only program of its kind in the California State University system. The Minor in Logistics was developed to allow Business Administration majors or students majoring in non-business programs to gain the knowledge and skills needed to gain entry-level employment in the field of transportation, warehousing, logistics planning, materials management, and physical distribution. In addition to the job opportunities that are available in the domestic arena, openings also exist in the international arena. Demand greatly exceeds supply both nationally and internationally for logistics managers.

Core courses in a student's major (Column 1 of the Degree Requirements Evaluation Worksheet) which are required in this minor must be replaced with substitute courses on the basis of individual petitions. For example, an Operations Management major would have to substitute another course for OM 332 in order to complete a Minor in Logistics because OM 332 is a required core course for all Operations Management students.

For more information, students should contact the chair of the Operations Management Department or the chair of the Marketing Management Department.

Completion of the following courses is required:

Prerequisites (16 units)

Elementary Statistics With Applications.	STA	120	(4)
Principles of Marketing Management ..	MKT	301	(4)
Managerial Statistics.	OM	314	(4)
Production and Operations Management I	OM	331	(4)

Core Requirements (20 units)

Business Logistics	MKT	309	(4)
Transportatioin Systems & Traffic Mgmt.	MKT	319	(4)
Production & Operations Mgmt. II.	OM	332	(4)
Logistics Strategy Planning, Decisions and Control	MKT	439	(4)
Business Logistics Modeling	OM	451	(4)

Directed Electives (8 units)

Select 8 units of course work from the following list: Each elective must be outside the student's major department.

Electronic Office Administration.	OM	310	(4)
Management Science.	OM	315	(4)
Telecommunications and Office Automation	OM	340	(4)
Advanced Managerial Statistics	OM	380	(4)
Forecasting Methods for Management .	OM	415	(4)
Material Requirements Planning.	OM	430	(4)
Materials and Inventory Management..	OM	433	(4)
Purchasing Management	OM	434	(4)
Operations Management in Services ...	OM	453	(4)
Industrial Marketing	MKT	407	(4)
International Marketing Management ..	MKT	414	(4)
Management of Marketing Channels...	MKT	431	(4)

TOTAL CORE AND ELECTIVE UNITS REQUIRED 28

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)

Critical analysis of business/economic institutions, policies and marketing practices as they affect consumer needs. Assisting individuals to become informed and effective buyers/consumers. Historical development of political and economic institutions as they impact individual consumers in multi-cultural environments. 4 lecture-discussion.

MKT 208 Professional Selling (4)

Persuasive personal communication on behalf of products, concepts, services. Individual counseling on oral presentations by students. 4 lecture/problem-solving.

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. Introduction to marketing strategy. 4 lecture-discussions.

MKT 302 Marketing Strategy (4)

Analysis, planning, implementation and control of marketing strategy. Target market, product, distribution, promotion and pricing decisions necessary to accomplish the firm's objectives. Emphasis on application of analytical techniques to improve decision making in a dynamic marketplace. 4 lecture-discussion. Prerequisite: MKT 301.

MKT 307 Promotional Strategies (4)

Fundamentals of marketing communication. Promotional strategy development: advertising messages and media, personal selling, sales promotion, publicity, packaging, branding and display. Promotional budgets. Development of communication strategies for new product, industrial, retail and services marketing. 4 lecture-discussion. Prerequisite: MKT 302 or permission of the 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 (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: OM 331 or permission of instructor.

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 316 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. Prerequisite: MKT 301 or permission of instructor.

MKT 319 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. Prerequisite: MKT 309

MKT 320 Market Analysis and Control (4)

Market identification and diagnosis. Market potential analysis based on direct data and buying power indexes. Analytical tools as applied to marketing management for planning and control. Extensive use of computer models and analysis. 4 lecture/problem-solving. Prerequisites: MKT 302, microcomputer proficiency, or permission of instructor.

MKT 326 Direct Marketing (4)

Role of direct marketing in marketing strategy. Investigation of various forms and uses of direct marketing as employed by manufacturers, wholesalers, retailers, politicians, not-for-profit and service organizations. 4 lecture-discussion. Prerequisite: MKT 307.

MKT 327 Sales Promotion (4)

Role of sales promotion in marketing strategy. Study of numerous incentives designed to increase sales or achieve other specific marketing objectives directed toward sales force, intermediaries, and consumers. Design of sales promotion plans. 4 lecture-discussion. Prerequisite: MKT 307.

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 402 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 302.

MKT 404 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 lecture/problem-solving. Prerequisite: MKT 301 or consent of instructor.

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 or permission of instructor.

MKT 408 Marketing Research I (4)

Theoretical and analytical foundations of marketing research. Topics covered include analysis of internal and external secondary data, marketing software packages, approaches to primary research, and research applications to marketing problems. 4 lecture/problem-solving. Prerequisites: MKT 302, MKT 320 and OM 314.

MKT 409 Marketing Research II (4)

Examination of the research process as an aid to decision making in marketing. Application of techniques in research design, data collection, sampling, computer-aided data analysis, and report writing to contemporary marketing research problems. 4 lecture/problem-solving. Prerequisites: MKT 408.

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 Management (4)

Planning and organizing for international marketing operations. Distinctive characteristics, environmental influences and emerging trends in overseas markets are examined. Analysis of management practices and problems of adapting American marketing concepts and methods. 4 lecture discussions. Prerequisite: MHR 322 or permission of instructor.

MKT 415 Strategy in International Marketing (4)

Development of alternative methods and strategies in the decision areas of product development, promotional programs, distribution channel determination and pricing. Opportunities, key issues and applications to ensure a firm's survival and success in the international arena are explored. 4 lecture/problem-solving. Prerequisite: MKT 414 or approval of instructor.

MKT 416 International Exporting (4)

Principles, strategies and mechanics of exporting to foreign nations. Political, legal, cultural and economic environments affecting export operations. Corporate programs and policies, involvement levels, financing, pricing, promotion and distribution strategies. Latin America, European Community, Pacific Rim specifics. Import trade mechanics. 4 lecture-discussion. Prerequisite: MKT 414.

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/problem-solving. Prerequisites: MKT 320, and senior standing.

MKT 431 Management of Marketing 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: MKT 302 or permission of instructor.

MKT 433 Evaluating Advertising Effectiveness (4)

Development of criteria to analyze the strategic and creative elements of advertising campaigns. Application of criteria to judge effective versus ineffective advertising in all major media: magazine, newspaper, outdoor, radio, and television. Production of a thirty-second television commercial. 4 lecture/problem-solving. Prerequisite: MKT 307.

MKT 435 Advanced Professional Selling (4)

Analysis of the sales representative as a professional marketing tactician in a market orientated firm. Emphasis on applied and theoretical approaches utilized to effectively manage a sales territory. Analysis of sales representatives in different industries. 4 lecture/problem-solving. Prerequisite: MKT 208.

MKT 437 Competitive Marketing Simulation (4)

Interactive computer marketing simulation designed to reflect business situations and provide practice in making managerial decisions in marketing strategy. Competitive approach requires development of marketing strategy, implementation of marketing tactics, and design of an advertising program. 4 lecture/problem-solving. Prerequisite: MKT 302.

MKT 439 Logistics Strategy Planning, Decisions and Control (4)

Planning and policy development for logistics strategy to maximize efficiency in material operations and with suppliers and customers. Development of cost and performance standards, controls and measurements to enhance decision-making. Designing integrated logistical systems. 4 lecture/problem-solving. Prequisites: MKT 309 and MKT 319.

MKT 441, 442 Internship in Marketing (1–8) (1–8)

Faculty-supervised on-the-job educational experience in the 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. Total internship credit limited to sixteen units. Prerequisite: Permission of departmental internship coordinator.

MKT 447 Retailing Problems (4)

Application of marketing theory to contemporary retailing problems. Identification of potential markets and development of effective research techniques in retail organizations. Integration of current marketing plans and strategies with the techniques of successful retail decision making. 4 lecture/problem-solving. Prerequisite: MKT 308.

MKT 449 Industrial Marketing Problems (4)

Application of marketing theory to contemporary industrial/organizational marketing problems. Integration of the techniques of successful decision making. 4 lecture/problem-solving. Prerequisite: MKT 407.

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: Senior standing or permission of instructor.

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

Ralph H. Miller, *Chair*
Mostafa El Agizy
William J. Cosgrove
A. Hassan Halati
John E. Knox
Joyce I. Kupsh
Charles E. Pinkus
P. Rama Ramalingam
Rhonda L. Rhodes
Leonard E. Ross
James M. Salvate
Robert R. Westerman
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 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/Operations Management
General Operations Management
Management Science/Statistics

A department advisor will help you choose elective courses that are compatible with your career interests in the above academic subject areas.

CORE COURSES IN MAJOR*

Required of all Business Majors**

Legal Environment of Business Trans...	FRL	201	(4)
Financial Accounting	ACC	224	(4)
Financial Accounting	ACC	225	(4)
Principles of Management	MHR	301	(4)
Principles of Marketing Mgmt.	MKT	301	(4)
Intro to Finance Mgmt I	FRL	304	(4)
Management Info Systems	CIS	310	(4)
Managerial Statistics	OM	314	(4)
Production & Operations Mgmt I	OM	331	(4)
Management Policies & Systems	MHR	410	(4)
or Management Policies & Systems	OM	411	

OM Required Courses:

Electronic Office Admin	OM	310	(4)
Management Science	OM	315	(4)
Production & Operations Mgmt II	OM	332	(4)
Undergraduate Seminar	OM	463	(2)
Senior Project	OM	461	(2)
and	OM	462	(2)

*A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

**Microcomputer proficiency must be demonstrated by passing a skills test or CIS 101 Introduction to Microcomputing.

Other courses to complete major:

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 OM majors)

Principles of Economics	EC	202	(4)
Restricted electives, excluding business, economics, or public administration			(8)
Unrestricted Electives			(12)

GENERAL EDUCATION

(Required of all OM majors)

American Civilization	AMC	201	(4)
or Introduction to American Government	PLS	201	
American Civilization	AMC	202	(4)
or United States History	HST	202	
Principles of Economics	EC	201	(4)
Freshman English I	ENG	104	(4)
Elementary Statistics with Appl.	STA	120	(4)
MHR 318 (4) plus 8 upper division units			(12)
Units to complete General Education			(40)

Quantitative Research Minor

The Quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Operations Management. A full description of this minor is included in the "University Programs" section of this catalog.

Minor in Logistics

Students from any major may participate in the Minor in Logistics. The Minor in Logistics, offered jointly by the Operations Management and Marketing Management Departments, is the only program of its kind in The California State University system. The Minor in Logistics was developed to allow Business Administration majors or students majoring in non-business programs to gain the knowledge and skills needed to gain entry-level employment in the field of transportation, warehousing, logistics planning, materials management, and physical distribution. In addition to the job opportunities that are available in the domestic arena, openings also exist in the international arena. Demand greatly exceeds supply both nationally and internationally for logistics managers.

Core courses in a student's major (Column 1 of the Degree Requirements Evaluation Worksheet) which are required in this minor must be replaced with substitute courses on the basis of individual petitions. For example, an Operations Management major would have to substitute another course for OM 332 in order to complete a Minor in Logistics because OM 332 is a required core course for all Operations Management students.

For more information, students should contact the chair of the Operations Management department or the chair of the Marketing Management department.

Completion of the following courses is required:

Prerequisites (16 units)

Elementary Statistics With Applications	STA	120	(4)
Principles of Marketing Management	MKT	301	(4)
Managerial Statistics	OM	314	(4)
Production and Operations Management I	OM	331	(4)

Core Requirements (20 units)

Business Logistics	MKT	309	(4)
Transportation Systems & Traffic Mgmt.	MKT	319	(4)
Production & Operations Mgmt. II	OM	332	(4)
Logistics Strategy Planning, Decisions and Control	MKT	439	(4)
Business Logistics Modeling	OM	451	(4)

Directed Electives (8 units)

Select 8 units of course work from the following list: Each elective must be outside the student's major department.

Electronic Office Administration	OM	310	(4)
Management Science	OM	315	(4)
Telecommunications and Office Automation	OM	340	(4)
Advanced Managerial Statistics	OM	380	(4)
Forecasting Methods for Management	OM	415	(4)
Material Requirements Planning	OM	430	(4)
Materials and Inventory Management	OM	433	(4)
Purchasing Management	OM	434	(4)
Operations Management in Services	OM	453	(4)
Industrial Marketing	MKT	407	(4)
International Marketing Management	MKT	414	(4)
Management of Marketing Channels	MKT	431	(4)

TOTAL CORE AND ELECTIVE UNITS REQUIRED 28

Course Descriptions

OM 103 Business and Its Environment (4)

American business system in its economic, social, political, national and international environment. Coverage of the major activities of business and the key institutions influencing its service to society. Participation in a computerized competitive business simulation. 4 lecture/problem-solving. Prerequisite: Passing score on ELM and a score on EPT to qualify for ENG 104.

OM 152 Introduction to Data Analysis (4)

Microcomputer operations and quantitative business applications to include graphics, time series, and index numbers. 4 lecture/problem-solving.

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. Instruction is by lecture, laboratory, or a combination of both. Prerequisite: permission of instructor.

OM 310 Electronic Office Administration (4)

Electronic technology for operations management including manufacturing, purchasing, inventory, transportation, and related staff functional areas involving production of goods and services. Word and data processing, telecommunications, database management, electronic spreadsheets, graphics, electronic records, copy processing, and reprographics. 4 lecture/problem-solving. Prerequisite: microcomputer proficiency.

OM 314 Managerial Statistics (4)

Business application of techniques that require knowledge of data distributions such as binomial, Poisson, and normal; probability; sampling theory. Use of statistical procedures for inference such as estimation, hypothesis testing, Chi-Square, regression and correlation. Use of microcomputers. 4 lecture/problem-solving. Prerequisite: STA 120 or equivalent and microcomputer proficiency.

OM 315 Management Science I (4)

Identification of the quantitative analysis process and solution of business problems by quantitative techniques. Introduction to quantitative tools of analysis and construction of quantitative models useful in business decision making. Application of computers. 4 lecture/problem-solving. Prerequisite: STA 120 or equivalent.

OM 316 Management Science II (4)

Introduction to probabilistic quantitative tools of analysis and applications for solving business problems. Decision theory, decision analysis with multiple criteria, introduction to stochastic processes, Markovian processes, computer simulation, reliability theory. 4 lecture/problem-solving. Prerequisite: OM 314.

OM 331 Production and Operations Management I (4)

Introduction to fundamental concepts of production and operations management. Use of quantitative methods, forecasting, resource allocation, decision theory, capacity planning, project management, inventory and quality control. Computer applications. 4 lecture/problem-solving. Prerequisite: OM 314.

OM 332 Production and Operations Management II (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/problem-solving. Prerequisite: OM 331, or concurrent enrollment in 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 lecture/problem-solving. Prerequisite: OM 331 and OM 332.

OM 334 Productivity Management (4)

Integrated approach to the four phases of productivity management, including the measurement, evaluation, planning, and improvement of productivity of basic economic units, including manufacturing and service organizations. Case studies. 4 lecture/problem-solving. Prerequisite: OM 331.

OM 340 Telecommunications and Office Automation (4)

Telecommunications in automated office systems. Decision making in the operations management environment by processing text, data, image, or voice communication. Electronic mail, databases, teleconferencing, facsimile, voice message systems, intelligent copiers and related areas. Classroom applications involving communication by means of quantitative and qualitative electronic reports. 4 lecture/problem-solving. Prerequisite: OM 310 .

OM 345 Ergonomics in the Electronic Office and Plant Environment (4)

Management of production and operations systems focusing on the interface of people, equipment, coordinated planning, and the work environment. Environmental issues include office and plant design, human factors, biometrics, anthropometry, and biomechanics. 4 lecture/problem-solving. Prerequisite: OM 310.

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/problem-solving. Prerequisite: OM 331.

OM 380 Advanced Managerial Statistics (4)

Application of advanced statistical methods to problems in business administration. Advanced techniques of analysis and inference including analysis of variance, multiple regression and correlation. Nonparametric statistics, correlation, and hypothesis testing. Use of computer packages. 4 lecture/problem-solving. Prerequisite: OM 314.

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 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. 4 case study. Prerequisite: Completion of College of Business Administration core requirements or consent of instructor.

OM 415 Forecasting Methods for Management (4)

Analysis of time series data. Forecasts for use in business decisions. Smoothing, decomposition, multiple regression, Box-Jenkins, autocorrelation, moving average, autoregression, ARMA, and ARIMA methods. Comparison and selection of suitable forecasting methods for a given application. Use of computer packages. 4 lecture/problem-solving. Prerequisite: OM 380.

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 computer packages. 4 lecture/problem-solving. Prerequisite: OM 380.

OM 417 Applied Resource Allocation (4)

Resource allocation and planning models. Applications of linear and non-linear programming models. Sensitivity analysis, goal programming, integer programming, dynamic programming, parametric programming, quadratic programming. Use of mathematical programming computer software. 4 lecture/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 lecture/problem-solving. Prerequisite: OM 314.

OM 430 Material Requirements Planning (4)

Concepts of material requirements planning. Elements, processing logic, lot sizing and updating the system. System records and files, product definition, interfaces, implementation, and operating considerations. Case studies. 4 lecture/problem-solving. Prerequisite: OM 331.

OM 432 Production and Inventory Management (4)

Management of production systems. Techniques of master production scheduling, short- and medium-range planning, aggregate inventory management, distribution resource planning, production activity control, scheduling and sequencing, shop floor control. Priority and input-output control. 4 lecture/problem-solving. Prerequisite: OM 331.

OM 433 Materials and Inventory Management (4)

Management of physical assets in service and manufacturing organizations. Deterministic and probabilistic models for inventory planning and control problems. Use of simulation in analyzing inventory problems is examined. Manufacturing and inventory planning systems are covered. 4 lecture/problem-solving. Prerequisite: OM 331.

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. 4 lecture/problem-solving. Prerequisite: OM 331.

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. 4 lecture/problem-solving. Prerequisite: OM 331.

OM 436 Project Management (4)

Study of CPM (critical path method), PERT (program evaluation and review technique) and other techniques for planning sequences of responsibilities to accomplish complex projects. Monitoring allocation of resources within rigid time and cost constraints. Use of computers. 4 lecture/problem-solving. Prerequisite: OM 331, or consent of instructor.

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. Prerequisites: OM 430, OM 432, and 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. A maximum of 8 units may be applied to the 44 unit directed elective requirement. Total credit limited to eight units each course. Prerequisite: consent of internship coordinator.

OM 451 Business Logistics Modeling (4)

Detailed coverage of the business logistics environment. Application of concepts and quantitative techniques in facility location, distribution, scheduling, order processing, storage, material handling and other logistics design and operating decisions. 4 lecture/problem-solving. Prerequisite: OM 331, MKT 309 or consent of instructor.

OM 453 Operations Management in Services (4)

Introduction to fundamental concepts of operations management in services. Design and scheduling of personnel activities. Service location problems. Vehicle scheduling and routing. Utilization of service capacity. Quality control in service operations. Management information systems. 4 lecture/problem-solving. Prerequisite: OM 331.

OM 454 Simulation of Manufacturing Operations (4)

Computer simulation of manufacturing operations. Introduction to factory simulation models. Simulation model development. Output analysis. Use of factory simulation model in analysis of manufacturing operations. 4 lecture-problem solving. Prerequisite: OM 331.

OM 455 Advances in Production/Operations Management (4)

Comparison of different production environments. Strategy for production. Detailed coverage of techniques for effective production systems: CAD/CAM, group technology, robotics, flexible manufacturing systems. 4 lecture/problem-solving. Prerequisite: OM 331 and OM 332.

OM 456 Case Studies in International 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. Prerequisites: OM 455, or consent of instructor.

OM 460 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. 4 seminar. Prerequisite: OM 314.

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. Required minimum of 120 hours. Prerequisite: senior standing.

OM 463 Undergraduate Seminar (2)

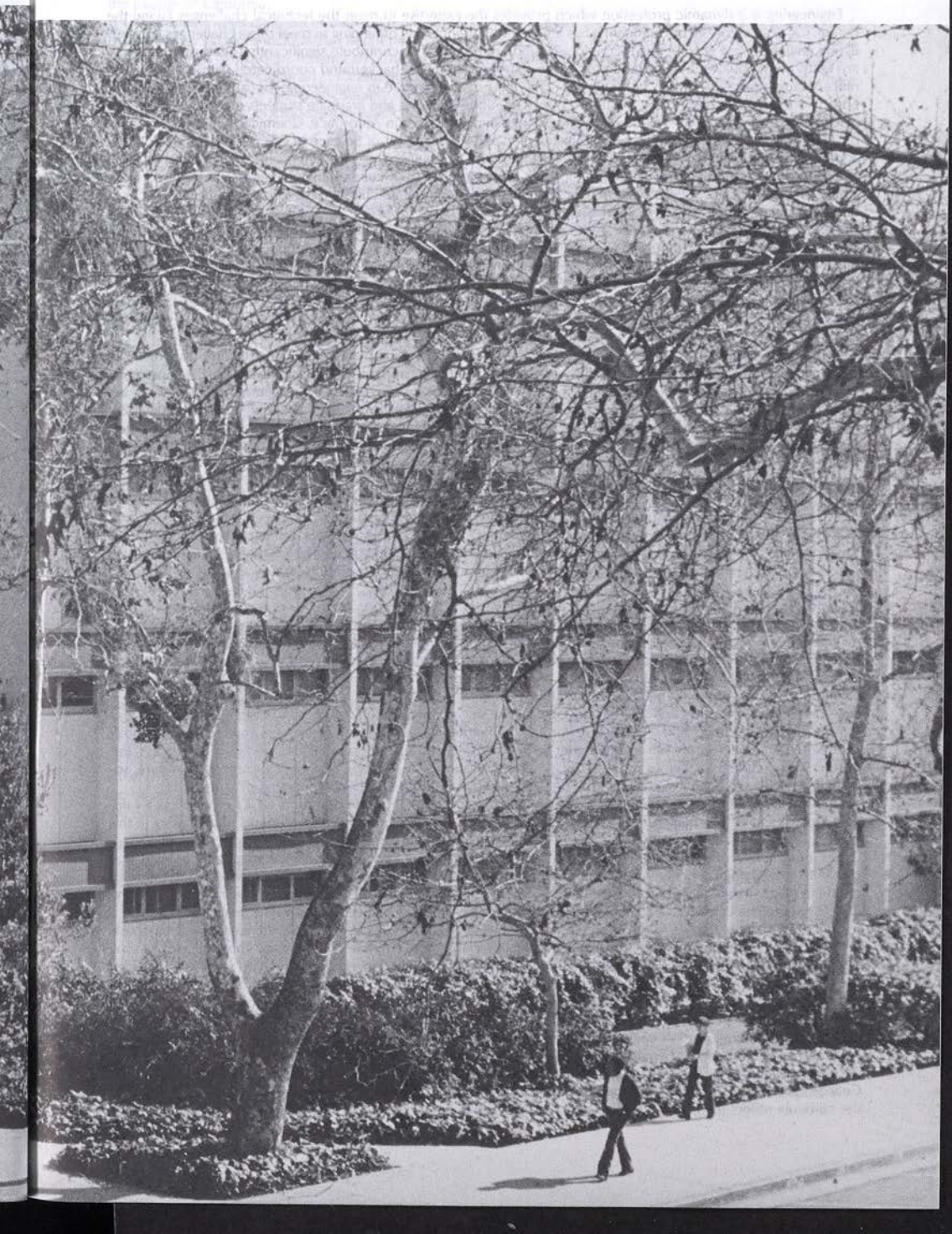
Study and discussion by students of recent developments in the students' major field. 2 lectures. Prerequisite: senior standing or permission of instructor.

OM 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. Prerequisite: permission of instructor.



COLLEGE OF ENGINEERING



COLLEGE OF ENGINEERING

Edward C. Hohmann, *Dean*

Carl E. Rathmann, *Associate Dean and Director, Graduate Studies*

Engineering is a dynamic profession which provides the expertise to meet the technical challenges facing the nation. Cal Poly's College of Engineering has a well-earned reputation of helping to meet these challenges by graduating engineers and engineering technologists who are prepared to contribute significantly to industry and who are ready for graduate studies. The emphasis on a strong theoretical background coordinated with early and significant laboratory experiences continues to make the program unique in engineering education. The College of Engineering provides study opportunities to over 4300 undergraduate and graduate students in seven engineering disciplines, offering programs leading to Bachelor of Science degrees in Aerospace, Chemical, Civil, Electrical, Industrial, Manufacturing, and Mechanical Engineering, and the Bachelor of Science in Engineering Technology. In addition, the graduate division offers individualized programs leading to the Master of Engineering degree with specializations in each of the engineering disciplines. The program in Agricultural Engineering is administered independently through the College of Agriculture. All of the undergraduate curricula are accredited by the Accreditation Board for Engineering and Technology (ABET).

Because engineering is a profession, our students are educated as professionals. In addition to learning the specific coursework material, our students must acquire the appropriate professional attributes of personal responsibility, ethics, social responsibility, fairness, motivation, enthusiasm for the task, professional pride, a strong sense of identity, and an understanding of the consequences of their actions. These attributes are fostered in our students not through training but rather via interaction with our faculty members, all of whom have spent a significant portion of their engineering careers in industry. The programs each require 202 units for the Bachelor of Science degree. The Master of Engineering degree requires an additional 45 units.

Each engineering curriculum is designed to give the student both an understanding of the fundamental principles of engineering as an applied science and the practical expertise to apply these principles to actual situations. In keeping with ABET criteria each engineering program incorporates four curricular areas into the educational experience: mathematics and basic sciences; engineering sciences; engineering design; and humanities and social sciences. Practice in all forms of communication is interwoven throughout the curriculum. While communication through mathematics is fundamental to engineering, the ability to clearly express oneself both orally and in writing must accompany the precision of mathematics and engineering drawings.

All of the engineering degree programs require an exceptionally strong aptitude in calculus and physics. Studies in mathematics are required at the undergraduate level through the calculus and differential equations, while the basic science requirement includes courses in physics, chemistry, and biology.

The engineering sciences have their roots in mathematics and the basic sciences, but carry knowledge further toward creative application. These studies provide a bridge between mathematics/basic sciences and engineering practice, and include mechanics, thermodynamics, electrical and electronic circuits, materials science, and transport phenomena.

Engineering design is the methodical procedure by which a system, component, or process is devised to meet a recognized need. It is an open-ended decision-making process in which the basic sciences, mathematics, and engineering sciences are applied through a process of synthesis and analysis to create the desired entity. This component of our curricula is particularly strong at Cal Poly and emphasizes student creativity, development and use of design methodology, formulation of design problem statements and specifications, consideration of alternative solutions, feasibility, and optimality considerations.

Studies in the humanities and social sciences serve not only to meet the objectives of a broad education, but also to meet the requirements of the engineering profession. In the interest of making engineers and technologists fully aware of their social responsibilities and better able to consider related factors in the decision-making process, this portion of the curricula includes coursework in communication skills, history, economics, fine arts, literature, sociology and related electives as part of the university's comprehensive General Education program.

Students in all majors are urged to consider the **Interdisciplinary General Education (IGE)** program as a valuable means of satisfying many of the General Education requirements of the degree. Students participating in this eight quarter sequence have the unique opportunity to become active members of a learning community.

It is important to distinguish between *Engineering* and *Engineering Technology*. Engineering Technology is that part of the technological field which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities; it lies in the occupational spectrum between the craftsman and the engineer. The engineering technologist is more specialized than the engineer, focussing on a technical specialty within an engineering discipline. Compared to the engineering curricula, there is less emphasis on basic science and mathematics and engineering science and more emphasis on skills and knowledge of existing technology related to design support; production; and equipment selection, modification, and service. Studies for the bachelor's degree in Engineering Technology include coursework in: mathematics and basic sciences; technical sciences, specialties, and electives; and social sciences/humanities and communication.

Unlike the more traditional engineering curricula which initiate engineering coursework in the junior year, Cal Poly's program demands that students take computer programming and engineering orientation courses in the freshmen year, and that mathematics, basic science, and general education courses begin concurrently. Throughout their educational programs students become adept at using both the university's computing facilities and the College's Computer Aided Engineering Laboratory facilities as part of their regular coursework. Specific features of the curricula reflect the input of the Industrial Advisory Boards, composed of leaders in local industry as well as

selected faculty members. Many of the engineering science and engineering design courses have laboratory components. Study of the ethical issues that confront those in the practice of engineering and the need for professional registration are an important part of the curriculum. In addition, many students pass the Engineer in Training Examination (EIT) before they graduate. As a result of this "learn by doing" environment, graduates of the College continue to be in great demand by industry in southern California, helping Cal Poly fulfill its mission of service to the people of California.

Departments have chapters of national professional societies and/or honor societies appropriate to their disciplines. Honor societies include Tau Beta Pi (engineering), Tau Alpha Pi (technology), Sigma Gamma Tau (aerospace), Omega Chi Epsilon (chemical), Chi Epsilon (civil), Eta Kappa Nu (electrical), Alpha Pi Mu (industrial), and Pi Tau Sigma (mechanical). In addition, chapters of the following cross-disciplinary organizations are active: the Institute of Robotics Engineers; Society of Women Engineers; National Black Science and Engineering Student Organization; Society of Hispanics in Science and Engineering; and the American Indian Science and Engineering Society.

Impaction and Supplemental Admissions Criteria

Several of the undergraduate programs in the college are impacted. Because the student demand for entry into those programs is greater than the College's resources can responsibly support, it has become necessary to impose supplemental admissions criteria in addition to the university's standard admission requirements, listed earlier in this catalog. Candidates interested in applying to any undergraduate degree program in the College of Engineering should contact the University Admissions Office for specific information. Unless otherwise stated, courses in the College of Engineering are open only to students who have been admitted to an engineering major appropriate to the particular course.

Drop and Withdrawal Policy

Students in the College of Engineering are expected to act responsibly in registering for courses and to be careful in satisfying prerequisites. Student maturity in successfully completing coursework is essential to the College's effort in ensuring that students graduate in a timely fashion. Accordingly, the College, with the approval of the Academic Senate, has adopted a drop policy which is a rather strict interpretation of the university's drop policy: Students in an engineering major who wish to drop *any* course after the third week of classes may do so only for sufficiently "serious and compelling" reasons; such reasons normally would require withdrawal from all courses for the remainder of the quarter. Details regarding this and all policies of the College are available in the Office of the Dean.

Change of Major Policy

No student may file a Change of Major petition with the College of Engineering until at least the second quarter of enrollment at Cal Poly. Students wishing to change into an impacted major must also have completed at least 18 units of baccalaureate level work prior to submission of the petition. Furthermore, until a student is formally accepted into an engineering major, he/she should not expect to take any engineering classes in anticipation of the petition being approved. All students wishing to change into an engineering major are required to attend one of the regularly scheduled informational meetings conducted by the Associate Dean, at which specific details of the change of major policy are available.

Interdisciplinary General Education (IGE)

The IGE Program is a nationally recognized, team-taught, thematically integrated sequence of courses that satisfies many of the General Education requirements of the College of Engineering. Engineering students are strongly urged to participate in the IGE program. The coursework has been planned to provide an interdisciplinary approach in examining complex problems of human culture from the different perspectives of the humanities, the social sciences and the arts. The IGE coursework is specially designed to meet the needs of engineering students in the areas of writing, reading and critical thinking, and, taken as a unit, probes some of the most important themes and issues bearing on the human condition. The program is limited in size and requires eight quarters to complete. Full details about the program are available at all freshmen orientation sessions.

Computer Aided Engineering Laboratory (CAE Lab)

The Computer Aided Engineering Laboratory is the home of several specialized computer systems used as tools in the analysis, design and simulation of various engineering problems. The computer systems span the range from personal computers, through graphic workstations and shared resource management systems, to a multi-user VAX 750 minicomputer. All engineering majors are selectively provided with CAE experience throughout their studies at Cal Poly, both through their regular coursework and via individualized projects, as appropriate to their disciplines. The Laboratory reflects the state-of-the-art computing environment prevalent in today's engineering companies.

Embedded Systems Laboratory

The Embedded Systems Lab is a recently established College facility, supported by the faculty in several departments, in response to a perceived need of our students in the area of automation, robotics and control. While industry tends to be the leader in new technological developments and applications, this laboratory is not only intended to expose students to the state-of-the-art, but also to sponsor long-term investigations into the application

of measurement, information handling, and control system theory and technology to the task of reducing the need for human intervention in a process.

Minority Engineering Program

The Minority Engineering Program is an academic community of American Indian, Black, and Hispanic students in engineering and computer science interested in achieving at the highest level both academically and professionally. A special orientation course helps these historically under-represented students make the transition to campus; Academic Excellence Workshops in foundation courses provide an opportunity for group study at a sophisticated level. Specially selected faculty advisors help assure the students' successful completion of the regular program of studies. Professional engineers and computer scientists serve as actively involved role models while providing practical information about career opportunities. The MEP Study Center provides a friendly environment in which the students can study together, talk with MEP staff, secure tutorial assistance, and find out about special MEP activities, field trips, summer job opportunities, and scholarships. Applicants must be US citizens or Permanent Residents.

Engineering Institute

The Engineering Institute is an organizational entity within the College having the express purpose of building and maintaining strong cooperative relationships between the campus and the engineering community. Its policy is to encourage professional activities among Cal Poly faculty and students and members of neighboring technical concerns in symbiotic relationships. Students benefit primarily by having faculty members who remain up-to-date in their fields, active on a daily basis with other practicing engineering professionals, and who transfer their professional enthusiasm to the students. The Institute is also the vehicle through which industry provides sought-after advice on keeping our engineering curricula current.

COLLEGE OF ENGINEERING MINORS

Energy Engineering Minor

John R. Biddle, *Chair*
Mechanical Engineering

Paul A. Lord,
Aerospace Engineering

A. George 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 departments of the College of Engineering and the Physics department of the College of Science a flexible, interdisciplinary program of study in the emerging and important field of energy engineering. The minor is designed to encourage engineering study and applied research directed toward 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 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 having these courses offered 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 energy industries.

Completion of the following courses is required:

Thermodynamics	ME	301	(4)
or Chem. Egr. Thermo. I	CHE	302	(4)
or Thermal Physics	PHY	333	(4)
Energy Management	ME	306	(4)
Alternative Energy Sys.	ME	307	(4)

The remainder (12) of the 24 units required for the minor will be selected from:

Air Pollution Control	ARO	418	(4)
Solid Waste Management	CE	457	(3)
Chem. Egr. Thermo. II	CHE	303	(4)
Pollution Abatement	CHE	432/433	(3)
Ocean Engineering	EGR	430	(4)
Control Systems Engineering	ECE	309	(4)
Thermodynamics	ME	302	(4)
Solar Thermal Engineering	ME	407	(4)
Nuclear Engineering	ME	408	(4)
Kinetic Theory/Stat. Thermo.	ME	409	(4)
Energy and the Environment	PHY	340	(4)
Adv. Nuclear Physics	PHY	404	(4)
Production Engineering I	MFE	324	(3)
Production Engineering II	MFE	325	(3)
Eng. Econ. Dec. Anl.	IE	401	(4)
Industrial Engineering Design	IE	429	(4)
Industrial Engineering Sys.	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 is concerned with studying the relationships among the properties and performance of materials to their structures. The College of Engineering provides a minor in Materials Science and Engineering to the student who satisfactorily completes the 24-unit requirement within his/her major curriculum. The minor is appropriate for all engineering and science 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 engineers or scientists are called upon to work with new ideas and materials, the broadly trained graduate has an ability to respond to such a challenge.

Students pursuing this minor are particularly encouraged to become active in the student chapter of ASM International.

Completion of the following courses is required:

Materials Science and Engr	MTE	207	(3)
or Engineering Matls.	ME	225	(3)
Materials Sci and Engr Lab	MTE	217	(1)
Strength of Materials	ME	218	(4)
or Aero Struct Mech	ARO	326	(4)
Three MTE 4xx courses			(10–12)

The remainder (4-6) of the 24 units required for the minor will be selected from:

Aero Struct Mech	ARO	327	(3)
Structural Design-Steel	CE	406	(4)
Organic Chemistry	CHM	315	(3)
Organic Chemistry	CHM	316	(3)
Polymer Chemistry	CHM	409	(3)
Intro Colloid & Surface Chem.	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)
Mfg. Processes-Sys Overview	MFE	221	(4)
Strength of Materials	ME	219	(3)
Welding Fabrication & Design	MTE	337	(3)
Adv Science of Materials	MTE	404	(4)
Phys Metallurgy-Mech. Properties	MTE	405	(4)
Phys Metallurgy-Solid & Strength	MTE	406/416	(4)
Ceramic Materials	MTE	407	(4)
Solid State Physics	PHY	406	(4)

Ocean Engineering Minor

George F. Engelke, *Chair,*
Mechanical Engineering

Christopher L. Caenepeel,
Chemical and Materials Engineering

Donald G. Wells,
Civil Engineering

Herbert A. Johnson,
Electrical and Computer Engineering

H. Paul Stymelski,
Engineering Technology

Ocean Engineering is a cross-disciplinary field dealing with all aspects of the marine environment. Subjects emphasized include marine structures, marine vehicles, marine chemistry, marine ecology, coastal and marine engineering. The Ocean Engineering minor has access to the research facilities of the CSU Ocean Studies Institute (OSI) and the 80' Research Vessel YELLOWFIN. Cal Poly facilities include circular tow tank, wave tank, two trailable boats, the Fluids Laboratory, etc.

The minor in Ocean Engineering is available to any engineering student. Aerospace, Civil, Electrical and Mechanical engineering majors may be able to acquire this minor within the framework of their normal degree requirements through careful substitution of certain requirements. Other engineering majors will find it necessary to take additional units beyond those required for the bachelor's degree.

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 the following courses is required:

Intro to Ocean Engineering	EGR	230	(2)
Ocean Electronics	ECE	434	(4)
Ocean Engineering	EGR	430	(4)
Oceanography	GSC	335	(4)

One course from:

Coastal Engineering	CE	455	(4)
Hydronautics	ARO	410	(4)
Underwater Sound	EGR	437	(4)
Special Topics	EGR	499	(1-4)

The remainder (6) of the 24 units required for the minor will be selected from:

Intro Marine Biology	BIO	220	(4)
Marine Ecology	BIO	442	(5)
Corrosion Chemistry	CHM	446	(4)
Coastal Processes	GSC	338	(4)
Welding Fab. & Design	MTE	337	(3)
Skin & Scuba Diving	PE	231	(3)

Departments, Majors, and Minors

MASTER OF ENGINEERING
Carl E. Rathmann, Director, Division of Engineering Graduate Studies.

AEROSPACE ENGINEERING
Rodney D. Sutherland, *Chair,* Aerospace Engineering (BS)

AGRICULTURAL ENGINEERING
Joe Y. T. Hung, *Chair,* Agricultural Engineering (BS)
This engineering program is listed under the College of Agriculture.

CHEMICAL AND MATERIALS ENGINEERING
Cordelia Ontiveros, *Chair,* Chemical Engineering (BS).

CIVIL ENGINEERING
Ronald L. Carlyle, *Chair,* Civil Engineering (BS).
Options in General Civil Engineering, Environmental Engineering, and in Surveying Engineering

ELECTRICAL AND COMPUTER ENGINEERING
Richard H. Cockrum, *Chair,* Electrical Engineering (BS)
Options in Computer Engineering, Electrical Engineering and in Electronic Engineering

ENGINEERING TECHNOLOGY
Edward V. Clancy, *Chair,* Engineering Technology (BS)
Options in Electronics and Computer, Construction, and General Engineering Technology.

INDUSTRIAL AND MANUFACTURING ENGINEERING
Andy R. Bazar, *Chair,* Industrial Engineering (BS), Manufacturing Engineering (BS)

MECHANICAL ENGINEERING
George F. Engelke, *Chair,* Mechanical Engineering (BS)
Options in Mechanical Engineering, Energy Systems Engineering and in Petroleum Engineering

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
George F. Engelke, *Chair,* Ocean Engineering Committee

College of Engineering Courses

All students in engineering and engineering technology curricula must satisfy the specified composition requirements prior to enrolling in any 300-level course in the College of Engineering.

EGR 110 Engineering Career Exploration and Orientation (1)

A three course sequence: study techniques and time management for technical majors, orientation to the programs and courses of study in the College of Engineering and in the Computer Science Department. Career Exploration. Open only to students in the Minority Engineering Program (MEP). Course may be repeated for a total credit limited to 6 units. 1 three-hour laboratory.

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 The Search for Solutions (4)

A study of the development of society using technology as the prime indicator of the maturing of civilizations. Expansion of the theme that technology has been and continues to be central to society's advances, satisfying life-support demands, and allowing the arts to develop. Discussion of the growth of technology and factors guiding its future growth. 4 lecture-discussions. Prerequisites: completion of General Education Categories IIa, IIb, and IIc requirements.

EGR 230 Introduction to Ocean Engineering (2)

The study of ships' characteristics and designs, nautical Rules of the Road, seamanship and safety at sea; the theory and use of nautical charts, compasses, ships' speed indicators, depth finders, radar; the methods of coastal navigation, piloting, dead reckoning; the behavior of winds, tides, and currents. The student will receive instruction and experience in boat handling using Cal Poly's trailable boats. A working cruise aboard the CSU Ocean Studies Institute's 80' ocean research vessel R/V YELLOWFIN will give the student experience of actual shipboard operations at sea. 2 lecture-problems. Prerequisites: Consent of the instructor.

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 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.

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 430 Ocean Engineering (4)

The engineering major is acquainted with the wide variety of physical and other factors involved when carrying out engineering tasks associated with the marine environment. Working cruises are made in the 80 foot R/V YELLOWFIN. Topics covered include: ocean and harbor wave actions; ocean basins, currents, and tides; ocean chemistry and physical characteristics; marine biology and fouling; wave and wind loads; ocean energy sources; deep ocean mining and drilling; navy ship systems, surface craft, remotely operated vehicles; marine corrosion, preservation; icing, thermal factors; shock, vibration; human factors; engineering requirements and documentation. 4 lecture-problems. Prerequisite: Upper division standing in the College of Engineering or consent of the instructor.

EGR 437 Underwater Sound (4)

Principles of underwater sound propagation and reception. The sonar equation. Transducer design and calibration. 4 lecture-problems. Prerequisite: Upper division standing and permission of the instructor.

EGR/SCI 460 Problems in Oceanographic Studies (3–5)

Course offered in conjunction with the CSU Ocean Studies Institute (OSI). Topics vary each term. May be repeated as needed. Upper division standing and permission of instructor required.

EGR 470, 471, 472, 473 Cooperative Education (2–4 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 department 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.

All EGR 500- and 600-level courses are listed in the graduate section of this catalog.

AEROSPACE ENGINEERING

Rodney D. Sutherland, *Chair*
Ali R. Ahmadi — Gabriel G. Georgiades — Paul A. Lord
Robert F. Davey — George R. Graves — William E. Mortensen

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 as well. The extreme environments in which these vehicles operate have dictated the construction of the most complex engineering systems devised by man and require integration and application of such disparate fields as fluid mechanics and thermodynamics, structural mechanics, control system theory and vehicle dynamics. Often the aerospace engineer is confronted with problems which cannot be fully defined but, in spite of this, which require imaginative and sophisticated solutions.

The accredited program provides a broad background in the humanities and social sciences, mathematics, basic science, engineering science, analysis, design and systems. The basic concepts taught in these areas are illustrated and reinforced by applications taken from current industrial practice. The advanced engineering (applied mechanics, computer applications, systems analysis) techniques which have been pioneered by the aerospace industry are a mainstay of the program. Facilities available for experimental studies include subsonic and supersonic wind tunnels, environment simulation equipment, a flight structures laboratory, and an aerospace construction laboratory.

Students desiring to major in Aerospace Engineering should have a particularly high aptitude for science and mathematics, and incoming freshmen should have taken substantial college preparatory courses in these disciplines in high school. Incoming transfer students should have completed at least one year of college calculus and one year of college physics (with laboratory) prior to beginning the program at Cal Poly. The community college student planning to transfer into this department should consult a school counselor or his department to determine which courses meet the program requirements.

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.

Aerospace engineering students are encouraged to become active in the student branch of the American Institute of Aeronautics and Astronautics, a national society organized for the advancement of aerospace knowledge. Qualified students are invited to join the student chapter of Sigma Gamma Tau, the aerospace engineering honor society.

In order for a student to register for the following senior courses: ARO 405, 406, 444, 445, 446, 461, 462, 463, he must have completed the following courses with a grade of C or better: ARO 124, 125, 126, 245, 246, 301, 305, 311, 312, 326, 327, 351, 355, 357, 401, 404.

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)
Introduction to Aerodynamics	ARO	245	(2)
Experimentation Systems	ARO	246	(2)
Vector Fluid Mechanics	ARO	301	(4)
Subsonic Aerodynamics	ARO	305	(4)
Propulsion Systems	ARO	312	(4)
Aerospace Feedback Control Systems	ARO	322	(4)
Intro to Structural Mech	ARO	326	(4)
Aerospace Structural Mech	ARO	327	(3)
Gas Dynamics Laboratory	ARO	351	(1)
Aerospace Structures Laboratory	ARO	357	(1)
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)
Advisor Approved Electives			(19)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

General Chemistry Lab	CHM	152	(1)
Elements of Elec Engr	ECE	231/251	(4)
Elec Instru & Control	ECE	333/383	(4)
Descriptive Geometry	MFE	125	(2)
or Comp Aided Drafting	MFE	210	
Calc of Several Variables	MAT	214	(3)
Calc of Several Variables	MAT	215	(3)
Diff Eqn	MAT	216	(4)
Vector Dynamics	ME	215	(4)
Materials Science	MTE	207	(3)
General Physics	PHY	131	(3)
General Physics	PHY	133	(3)
General Physics Laboratory	PHY	151	(1)
General Physics Laboratory	PHY	153	(1)

*A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

GENERAL EDUCATION

(Required of all students)

Category I

Freshman English I	ENG	104	(4)
Freshman English II	ENG	105	(4)
Communication & Aesthetics	SA	290	(2)

Category II

Analytical Geom & Calc	MAT	114	(4)
Analytical Geom & Calc	MAT	115	(4)
Analytical Geom & Calc	MAT	116	(4)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Laboratory	CHM	151	(1)
Life Science	BIO	110	(3)
General Physics	PHY	132	(3)
General Physics Laboratory	PHY	152	(1)

Category III

Communications & Aesthetics	SA	290	(2)

Category IIIb Elective ..... (4)
Category IIIc Elective ..... (4)

Category IV

Prin. of Economics	EC	201 or 202	(4)
Political Sociology	SOC/PLS	290	(4)

Category V

Category V Elective ..... (4)

Category VI

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	

Category VII

Thermodynamics	ME	301	(4)
Laplace Tran & Fourier Series	MAT	317	(3)
Math Analysis of Engr Problems	MAT	318	(3)
Gas Dynamics	ARO	311	(3)

Course Descriptions

All students in engineering and engineering technology curricula must satisfy the specified composition requirements prior to enrolling in any 300-level course in the College of Engineering.

ARO 124 Aerospace Engineering Fundamentals (2)

Application of basic engineering fundamentals to aerospace problems. Concepts of fluid flow. Introduction to BASIC programming. 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. Fortran programming, flow charting, computational error analysis, data evaluation and presentation. Solution of problems generated from the aerospace sciences. 1 lecture-problems. 1 three-hour laboratory. Prerequisite: MAT 114.

ARO 245 Introduction to Aerodynamics (2)

Atmosphere. Airfoil and wing geometry. Airfoil pressure distributions. Aerodynamic coefficients. Airspeed measurements. 2 lecture-problems. Prerequisites: ARO 126, C or better in MAT 116.

ARO 246 Experimentation Systems (2)

Planning of experiments, and error analysis. Data analysis by statistical and numerical methods. Matrix 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-problems, 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 lecture-problems. Prerequisite: MAT 214, 215, concurrent MAT 318.

ARO 305 Subsonic Aerodynamics (4)

Chordwise and spanwise wing loading. Pressure, induced skin friction drag. Drag polars. Blade element theory. Helicopter rotor aerodynamics. Fuselage aerodynamics. Performance (energy methods); steady flight, accelerated flight, take-off and landing. 4 lecture-problems. Prerequisite: ARO 245, ARO 301.

ARO 311 Gas Dynamics (3)

Thermodynamic processes. One-dimensional compressible flow. Area change, friction, heat addition. Normal and oblique waves. Nozzle and diffuser theory. 3 lecture-problems. Prerequisite: 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 lecture-problems. Prerequisite: ARO 311.

ARO 322 Aerospace Feedback Control Systems (4)

Mathematical models of systems. Feedback control systems: characteristics, performance, stability. Root locus method. Frequency response methods. Stability in the frequency domain. Time domain analysis. Design and compensation of aerospace feedback control systems. 4 lecture-problems solving sessions. Prerequisites: ECE 333, MAT 216, ME 215.

ARO 326 Introduction to Structural Mechanics (4)

Vector statics for equilibrium. Engineering material properties, elasticity, environmental effects. Uniaxial, two- and three-dimensional states of stress and strain. Shear and moment diagrams, beam flexural and shear stresses. 4 lecture-problems. Prerequisites: ME 214, MAT 215.

ARO 327 Aerospace Structural Mechanics (3)

Flexural loading, elastic curve deflections, statically indeterminate beams, plastic analysis, theories of failure fatigue design, column and instability theory. Applications to aerospace structures. 3 lecture-problems. Prerequisite: ARO 326.

ARO 328 Aerospace Structure (4)

Aerospace structural analysis in the design process. Semi-monocoque structures. Energy methods in structural analysis. 4 lecture-problems. Prerequisite: ARO 327.

ARO 351 Gas Dynamics Laboratory (1)

Measurements in compressible flow. Flow visualization techniques. Operation of supersonic wind tunnel. 1 three-hour laboratory. Prerequisite: ARO 246. Concurrent: ARO 301.

ARO 357 Aerospace Structures Laboratory (1)

Experimental stress analysis, strain gages and photoelasticity. 1 three-hour laboratory. Prerequisite: ARO 246. Concurrent: 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. Heat exchangers. Solar radiation. Mass transfer, molecular diffusion. 4 lecture-problems. Prerequisite: ARO 126 or equivalent, ARO 301, MAT 216.

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 lecture-problems. 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 lecture-problems. Prerequisite: ARO 311 or consent of instructor.

ARO 405 Aerospace Vehicle Stability and Control (4)

Airplane equations of motion. Stability derivatives. Static Stability. Airplane controls. Dynamic stability. Transfer functions. Airplane response and simulation. Flying qualities. 4 lecture-problems. Prerequisite: ARO 305, 322, 404, Concurrent: ARO 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 lecture-problems. Prerequisites: ARO 305, 406, MAT 317.

ARO 408 Introductory Finite Element Structures (4)

Matrix operations. Stiffness and flexibility methods. Finite element properties. Computer applications. Structural dynamics. 4 lecture-problems. Prerequisite: ARO 327.

ARO 409 Astrodynamics (4)

Space environment. Kepler's laws of motion and satellite orbits, orbital transfers. Space vehicle motion, despinning of satellites. Performance and optimization of single and multistage rocket. 4 lecture-problems. Prerequisite: ARO 406.

ARO 410 Hydronautics (4)

Wave mechanics: linear and non-linear surface waves. Wave measurements. Analysis of a random sea: probabilistic processes, wave height, particle velocities and spectral densities. Wave induced forces, moments and vibrations on fixed structures. Floating structures: coupled heaving and pitching motion. Wave effects on moored and towed bodies. Statics and dynamics of surface and submersible vehicles. Hydrofoil performance. 4 lecture-problems. Prerequisite: Fluid dynamics course or consent of instructor.

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 lift effects. Twist. Wing force and moment coefficients. High lift devices. 4 lecture-problems. Prerequisite: ARO 305.

ARO 414 Rocket Propulsion Systems (4)

Principles of rocket propulsion. Combustion chemistry. Liquid-fuel rocket engines. Solid-fuel rocket engines. Electrical propulsion. 4 lecture-problems. Prerequisite: ARO 312.

ARO 418 Air Pollution Control (4)

Application of engineering concepts to atmospheric pollution problems. Combustion. Reaction kinetics. Diffusion. Atmospheric emissions; particulate, gaseous. Atmospheric boundary layer. Plume rise. Photochemical smog. Control concepts. Air quality modelling. 4 lecture-problems. Prerequisites: Thermodynamics and fluid dynamics courses or consent of instructor.

ARO 420 Introduction to Engineering Management (4)

Elements of management. Organization of corporations, engineering groups, and government agencies. Utilization of marketing and internal research funds. Program management. Participative management. Managing technical personnel. Career enhancement. 4 lecture-problems. Prerequisite: ARO 322.

ARO 422 Advanced Aerospace Control Systems (4)

Review of classical controls. Control system design. Compensators. Nonlinear systems. Describing functions. 4 lecture-problems. Prerequisite: ARO 322.

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 lecture-problems. 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. 4 lecture-problems. 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 436 Mechanics of Composite Materials (4)

Mechanical behavior of composite materials. Stress/strain relations in anistropic materials. Strength criteria and stiffness. Interlaminar stresses. Systems applications. Bending, buckling and vibration of laminated plates. 4 lecture-problems. Prerequisite: ARO 327.

ARO 444 Advanced Aerospace Analysis (3)

Formulation of mathematical models for physical phenomena by vector, matrix and tensor methods. Coordinate systems and transformations. Virtual displacement techniques applied to steady state systems. Applications to aircraft and spacecraft. 2 lecture-problems, 1 three-hour laboratory. Prerequisites: ARO 312, 327, 401, 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 and spacecraft systems. 2 lecture-problems, 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, concurrent ARO 444.

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. Prerequisite: ARO 312, 327, 351, 355, 357, 401, 404.

ARO 463 Aerospace Design Seminar (2)

Completion of ARO 446 design project. Utilization of carpet plots in preliminary design. Preparation of final report on the project together with an oral briefing to an industrial design review panel. 2 three-hour laboratories. Prerequisite: ARO 446.

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.

AGRICULTURAL ENGINEERING

Joe Y.T. Hung, *Chair*
Ramesh Kumar Charles M. Stark Eudell G. Vis
Floyd V. Matthews, Jr.

Agricultural Engineering is becoming increasingly important as agriculture grows to incorporate highly automated methods of operation. Agricultural Engineers are called upon to apply engineering principles to such interests as food engineering, soil and water, electric power and processing, power and machinery, and 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. 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 learn how to design machines for automatic harvesting of fruits and vegetables and study the power testing of tractors, hydraulic systems, and the effects of noise and vibrations on the equipment operator. Cal Poly offers a strong emphasis in irrigation, both in agriculture and landscape irrigation systems design. This department is at the forefront in the application of drip or trickle irrigation methods as adapted to agriculture and landscape irrigation systems design as well as the conservation of water.

The Agricultural Engineering curriculum is accredited by the Accreditation Board for Engineering and Technology (ABET). Students desiring to major in Agricultural Engineering should have a particularly high aptitude for science and mathematics, and incoming freshmen should have taken substantial college preparatory courses in these disciplines in high school. Incoming transfer students should have completed at least one year of college calculus and one year of college physics (with laboratory) prior to beginning the program at Cal Poly. The community college student planning to transfer into this department should consult a school counselor or his department to determine which courses meet the program requirements.

Students are urged to consider the Integrated General Education (IGE) program as a valuable means of satisfying the General Education requirements of the degree.

Graduates of the program are prepared to do productive work in their first jobs 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.

Agricultural Engineering students are encouraged to become active in the student branch of the American Society of Agricultural Engineers and the Agricultural Engineering Club.

CORE COURSES FOR MAJOR*

(Required of all students)

Introduction to Agricultural Engineering	AE	101	(1)
Workshop Activities	AE	103	(3)
Engineering Analysis of Agricultural Machines	AE	210	(3)
Processing Equipment and Procedures for Agricultural Products	AE	234	(3)
Agricultural Engineering Surveying	AE	245	(3)
Agricultural Engineering Computations	AE	252	(4)
Strength of Biological Materials	AE	330	(3)
Food Process Engineering	AE	332	(4)
Instruments and Controls	AE	350	(3)
Human Engineering	AE	410	(2)
Hydraulic Systems	AE	411	(3)
Farm Power and Machinery Design	AE	415	(4)
Agricultural Environments and Structures	AE	420	(3)
Irrigation Engineering	AE	440	(4)
Erosion Control & Drainage Engineering	AE	441	(4)
Senior Project	AE	461	(2)
Ag Engineering Design	AE	464	(4)
Applied Elec Engr	ECE	232	(4)
Strength of Mtrls	ME	218	(3)
Strength of Mtrls	ME	219	(3)
Strength of Mtrls Laboratory	ME	220	(1)
Thermodynamics	ME	301	(4)
Fluid Mechanics	ME	311	(3)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

General Chemistry	CHM	112	(3)
General Chemistry Lab	CHM	152	(1)
Analytic Geometry and Calculus	MAT	116	(4)
Calculus of Several Variables	MAT	214	(3)
Calculus of Several Variables	MAT	215	(3)
Differential Equations	MAT	216	(4)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Physics Lab	PHY	152	(1)
General Physics Lab	PHY	153	(1)
Basic Soil Science	SS	231	(4)
Ag Sci Elec (restr'd See advisor)			(3)
Engr Design Elect (restricted)			(8)
Engr Science Elect (restricted)			(4)
UNRESTRICTED ELECTIVES			(0)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

GENERAL EDUCATION COURSES

Category I			
Freshman English I	ENG	104	(4)
Advocacy and Argument	COM	204	(4)
Report Writing	COM	216	(4)
Category II			
Analytic Geometry and Calculus	MAT	114	(4)
Analytic Geometry and Calculus	MAT	115	(4)
General Physics	PHY	131	(3)
General Physics Lab	PHY	151	(1)
Life Science	BIO	110	(3)
General Chemistry	CHM	111	(3)
General Chemistry Laboratory	CHM	151	(1)
Plants and Civilization	AGR	111	(4)
Category III			
One course from each area of IIIa and c			(8)
IIIb: Ethics and Engineering Decision Making	CPU	401	(4)
Category IV			
Any course from Area A			(4)
Introduction to Geography	GEO	102	(4)
or Principles of Sociology	SOC	201	
Any Course from Area C			(4)
Category V			
Any Category V Course			(4)
Category VI			
American Civilization	AMC	201	(4)
or Introduction to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	
Category VII			
Engineering Economic Decision Analysis	IE	401	(4)
Product Liability and Patents	EGR	401	(4)

LANDSCAPE IRRIGATION DESIGN MINOR

Utility Systems	AE	122	(2)
Landscape Hydraulics	AE	221	(4)
Microprocessors and Computers	AE	251	(3)
Landscape Sprinkler Irrigation	AE	321	(4)
Drip Irrigation	AE	340	(3)
Landscape Drainage	AE	341	(4)
Landscape Irrigation Remote Controls	AE	451	(3)
Landscape Irrigation Trouble Shooting	AE	452	(3)
College Algebra	MAT	105	(4)
Landscape Drafting	PA	211	(4)
Total units required in minor			(34)

Course Descriptions

† All courses offered by the department may be taken on a CR/NC basis except for major. For complete listing of courses in this major see the appropriate section under the College of Agriculture.

CHEMICAL AND MATERIALS ENGINEERING

Cordelia Ontiveros, *Chair*
Robert S. Bray
Victoria L. Birrell
Christopher L. Caenepeel
Edward C. Hohmann
Thuan K. Nguyen
Julie M. Schoenung
Garland E. Scott, Jr.
Henry P. Sheng
A. George Stoll
Joseph P. Tassoney
John L. Tomlinson

Chemical Engineering is the branch of engineering which embraces the development and application of industrial processes which involve chemical and physical changes of material. These processes 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 accredited 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 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 and materials. A senior research program enables students to develop essential planning, experimenting and reporting skills in subjects 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.

Courses in materials engineering are offered by the department and include studies in the properties and behavior of engineering materials. Emphasis is placed on the atomic, molecular, and crystalline structures, 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's laboratories include facilities for metallography, heat treating, mechanical properties testing, materials joining, semiconductor crystal growing, and nondestructive testing.

Students desiring to major in Chemical Engineering should have a particularly high aptitude for science and mathematics, and incoming freshmen should have taken substantial college preparatory courses in these disciplines in high school. Incoming transfer students should have completed at least one year of college calculus and one year of college physics (with laboratory) prior to beginning the program at Cal Poly. The community college student planning to transfer into this department should consult a school counselor or his department to determine which courses meet the program requirements.

Chemical and Materials Engineering students are encouraged to become active in the student chapters of the American Institute of Chemical Engineers and of ASM International. Qualified students are invited to join the student chapter of Omega Chi Epsilon, the chemical engineering honor society.

Core Courses in Major *

Intro to CHE	CHE	131	(1)
Computer Programming	CHE	132/142	(2)
CHE Data Treatment	CHE	133/143	(2)
Stoichiometry I	CHE	201/211	(3)
Stoichiometry II	CHE	202/212	(3)
CHE Thermo I	CHE	302	(4)
CHE Thermo II	CHE	303	(4)
Kinetics/Reactor Des	CHE	304	(4)
Momentum Transport	CHE	311	(4)
Energy Transport	CHE	312/322	(4)
Mass Transport	CHE	313/333	(4)
Proc Model & Analysis	CHE	415	(4)
Unit Operations I	CHE	425/435	(4)
Process Control	CHE	426/436	(4)
Unit Operations II	CHE	427/437	(4)
Pol. Abate. & Haz. Mat. Mgmt.	CHE	432/433	(3)
Chem Processes	CHE	441/451	(4)
Chem Proc Syn & Des I	CHE	442/452	(4)
Chem Proc Syn & Des II	CHE	443/453	(4)
Senior Project	CHE	461	(2)
Senior Project	CHE	462	(2)
Undergrad Seminar	CHE	463	(2)
Units Required			(68)

Support Courses

Gen Chemistry	CHM	113	(3)
Gen Chemistry	CHM	152	(1)
† Organic Chem	CHM	314	(3)
† Organic Chem	CHM	315	(3)
† Organic Chem	CHM	316	(3)
† Organic Chem Laboratory	CHM	317	(1)
† Organic Chem Laboratory	CHM	318	(1)
Elem Elec Engr	ECE	231/251	(4)
Calc of Sev Var	MAT	214	(3)
Calc of Sev Var	MAT	215	(3)
Diff Equation	MAT	216	(4)
Vector Statics	ME	214	(3)
Strength of Materials	ME	218	(3)
Mtls Sci/Engr.	MTE	207/217	(3)
MTE Elective	MTE	4xx	(4)
Gen Physics	PHY	131	(3)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

† Approved Community College Course Credit in Organic Chemistry will be accepted for this course.

Gen Physics	PHY	151	(1)
Gen Physics	PHY	133	(3)
Gen Physics	PHY	153	(1)
Units Required			(52)

General Education

Category I			
Freshman English I	ENG	104	(4)
Communications & Aesthetics	SA	290	(4)
Report Writing	COM	216	(4)
or Writing for the Profession	ENG	301	(4)
Category II			
Anal Geometry & Calculus	MAT	114	(4)
Anal Geometry & Calculus	MAT	115	(4)
Anal Geometry & Calculus	MAT	116	(4)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Laboratory	CHM	151	(1)
Life Science	BIO	110	(3)
General Physics	PHY	132	(3)
Physics Lab	PHY	152	(1)
Category III			
IIIb Elective			(4)
IIIc Elective			(4)
Category IV			
IVa Eng Econ Dec Anl	IE	401	(4)
or IVA Elective			
IVb Elective			(4)
IVc Elective			(4)
Category V			
Category V any course			(4)
Category VI			
American Civilization	AMC	201	(4)
or Intro to Amer Government	PLS	201	(4)
American Civilization	AMC	202	(4)
or United States History	HST	202	(4)
Category VII			
Physical Chemistry	CHM	311	(3)
Physical Chemistry	CHM	312	(3)
Physical Chemistry	CHM	313	(3)
Kinetics & Reactor Design	CHE	304	(4)

Course Descriptions

All students in engineering and engineering technology curricula must satisfy the specified composition requirements prior to enrolling in any 300-level course in the College of Engineering. Lecture and laboratory courses listed together are to be taken concurrently.

CHE 131 Introduction to Chemical Engineering (1)

An introduction to chemical engineering. Business communication. Use of the personal computer to facilitate better business communication. 1 three-hour laboratory.

CHE 132/142 Computer Programming with Chemical Engineering Applications/Laboratory (1/1)

Introductory course in both BASIC and FORTRAN 77 programming covering computer systems, flowcharts, Input/Output, arrays, data filed and subroutines. Students will master programming in both languages by solving chemical engineering problems in areas such as stoichiometry, fluid mechanics, heat and mass transter. 1 lecture-problems, 1 three-hour computational laboratory.

CHE 133/143 Chemical Engineering Data Treatment/Laboratory (1/1)

Introductory course in elementary statistics using data from Chemical Engineering experiments. Statistical and linear analysis heavily dependent on computer methods. 1 lecture-problems, 1 three-hour computational laboratory. Prerequisite: CHE 132.

CHE 201/211, 202/212 Stoichiometry I/Laboratory (2/1), Stoichiometry II/Laboratory (2/1)

Material and energy balances for physical and chemical processes. Process flow diagrams. Equilibrium stage concept. Introduction to engineering design through a case study project. Practice in report writing and oral presentation of chemical process concepts. 2 lecture-problems, 1 three-hour computational laboratory. Prerequisites: CHE 132, CHM 113, MAT 116.

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 and phase transition. Heat engines, heat pumps, steam power plant, refrigeration cycles. Some problems involving process design based on thermodynamics. 4 lecture-problems. Prerequisites: MAT 215, 216, CHE 202.

CHE 303 Chemical Engineering Thermodynamics II (4)

Phase equilibria of ideal and non-ideal systems. Concepts of fugacity, activity, and activity coefficient. Calcu114048lation of thermodynamic properties from laboratory data. Enthalpy changes of mixing. Chemical reaction equilibria. Thermodynamic design of processes involving phase equilibria. 4 lecture-problems. Prerequisites: CHE 302.

CHE 304 Kinetics and Reactor Design (4)

Chemical reaction kinetics of homogeneous and heterogeneous systems. Analysis of kinetic data. Reactor design, including batch, mixed flow, and plug flow reactors. 4 lecture-problems. Prerequisites: CHE 303.

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, and piping design. 4 lecture-problems. Prerequisites: MAT 215, 216, ME 214, CHE 202, and ENG 104 or ENG 102 and 103. Corequisite: CHE 302.

CHE 312/322 Energy Transport/Laboratory (3/1)

Heat transfer with application to the unit operations of chemical engineering, including topics in energy transfer by conduction, convection and radiation, and heat exchanger design. 3 lecture-problems. 1 three-hour laboratory. Prerequisites: CHE 311. Corequisite: CHE 303.

CHE 313/333 Mass Transport/Laboratory (3/1)

Mass transfer and its application to the unit operations of chemical engineering, including topics in molecular diffusion, convective diffusion, simultaneous heat and mass transfer, and process design of distillation and absorption towers. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: CHE 312, 303.

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 lecture-problems. 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.

CHE 415 Process Modeling and Analysis (4)

Mathematical modeling of physical and chemical processes. Analytical and numerical solutions for steady and unsteady state problems. Design project based on results of modeling. 4 lecture-problems. Prerequisites: CHE 304, 313, CHM 313, 316.

CHE 425/435 Unit Operations I/Laboratory (3/1)

Treatment of mass, momentum and heat transport viewed with the traditional unit operations emphasis. Multicomponent and multiphase systems are considered, with some problems involving design. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: CHE 304, 313, CHM 313, 316.

CHE 426/436 Process Control/Laboratory (3/1)

Introduction to theory, design, and application of automatic control systems to chemical and physical processes. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: CHE 415.

CHE 427/437 Unit Operations II/Laboratory (3/1)

A continuation of the unit operations approach to mass, momentum and heat transfer with emphasis on collaborative design. 3 lectures. 1 three-hour laboratory. Prerequisites: CHE 425.

CHE 428/438 Machine and Process Control/Laboratory (3/1)

Introduction to theory and application of automatic control to hydraulic, pneumatic, thermal, mechanical and electrical systems. Control circuit design using analog and digital controllers, microprocessor-based programmable controllers and sequencers. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ME 413, 415, and ECE 333.

CHE 432/433 Pollution Abatement and Hazardous Materials Management/Laboratory (2/1)

Identification and development of solutions to problems created in the environment by modern industry. Topics in air pollution, water pollution, and solid waste. Group project involving a comprehensive study and preliminary design, including a cost analysis. 2 lecture-problems, 1 three-hour laboratory. Prerequisite: CHM 316 and senior standing in engineering courses.

CHE 441/451 Chemical Processes/Laboratory (3/1)

Introduction to process plant design methodology. On-site study of selected process industries. Design problems related to process industries visited. 3 lecture-problems and 1 three-hour laboratory. Prerequisites: CHE 304, 313, CHM 313, 316.

CHE 442/452 Chemical Process Synthesis and Design I/Laboratory (2/2)

Integration of unit processes, unit operations and their economics in the synthesis of the total chemical process and plant. Use of process simulators. 2 lecture-problems and 2 three-hour computational laboratories. Prerequisites: CHE 441.

CHE 443/453 Chemical Process Synthesis and Design II/Laboratory (2/2)

Economic and engineering principles guiding the selection of chemical processes, design of optimum flows and equipment, and design of process operations and a plant. Emphasis on use of 'process' simulators. 2 lecture-problems, 2 three-hour computational laboratories. Prerequisites: 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. Emphasis will be placed on engineering design. Prerequisites: CHE 304, 313, CHM 313, 316.

CHE 463 Undergraduate Seminar (2)

Ethics and professionalism in engineering. Research on, and presentation of, recent developments in chemical engineering, which may include results of senior project work. 2 seminar-discussion. Prerequisites: 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 207/217 Materials Science and Engineering/Laboratory (3/1)

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 lecture-problems, 1 three-hour Laboratory. Prerequisites: CHM 112, PHY 131 and MAT 116.

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 lecture-problems, 1 three-hour laboratory. Prerequisite: ME 214, MTE 207 or ME 225.

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. 3 lecture-problems. Prerequisite: MTE 207 or ME 225.

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 lecture-problems. Prerequisite: material science course.

MTE 406/416 Physical Metallurgy—Solidification and Strengthening Reactions/Laboratory (3/1)

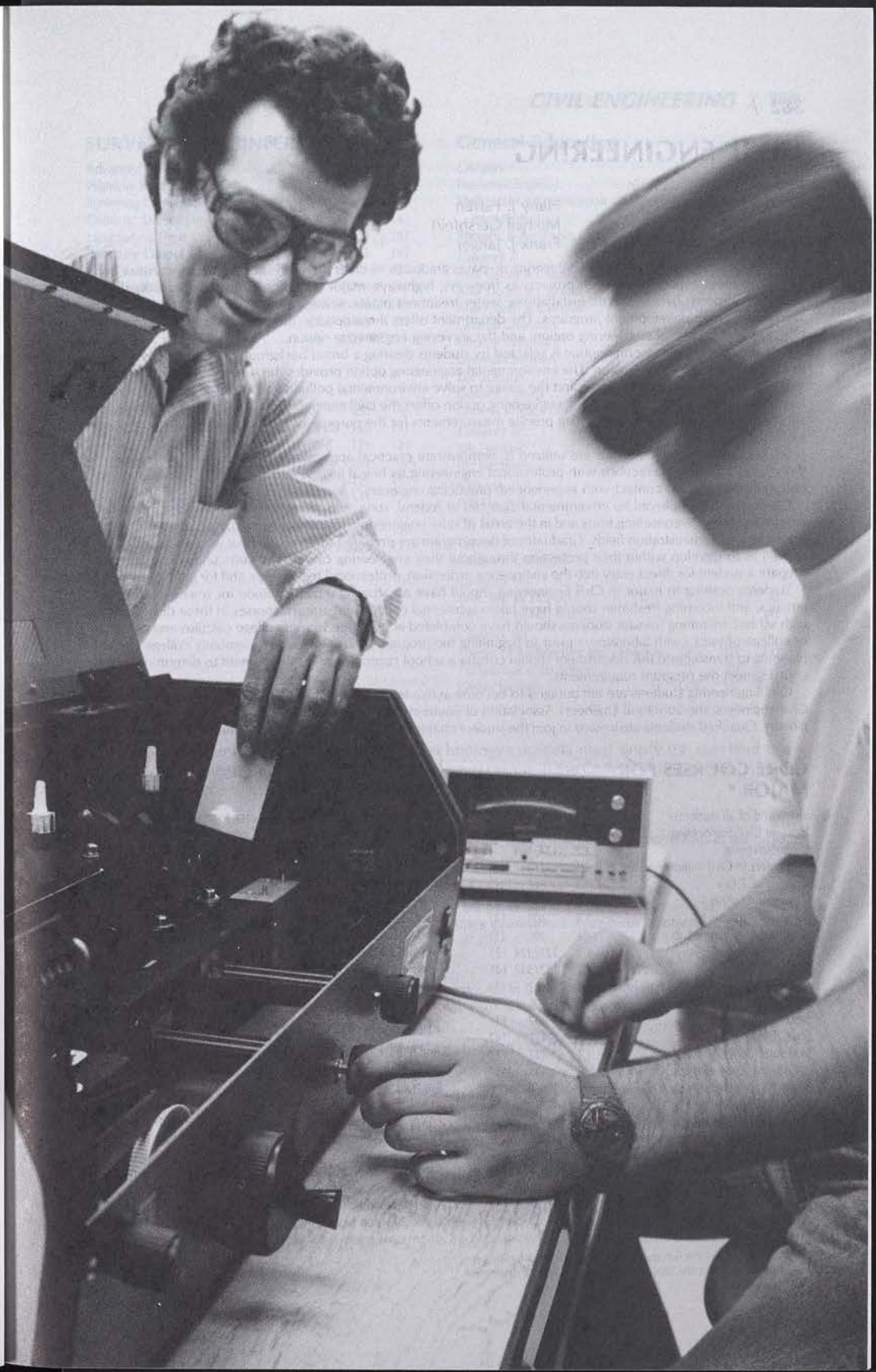
Principles of solid-state reactions including elementary kinetics, nucleation and growth theory; annealing of cold-worked metals; diffusionless transformation, precipitation reactions and tempering; physical metallurgy of steels; relation between properties and microstructure. Laboratory experiments related to phase transformations in steel and precipitation hardening. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: material science course.

MTE 407 Ceramic Materials (4)

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. 3 lecture-problems, 1 three-hour laboratory. 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

Ronald L. Carlyle, *Chair*
Jerome N. Borowick
Peter J. Clark
Donald P. Coduto
Hany J. Farran
Mikhail Gershfeld
Frank J. Janger
Ray Morales
Howard Turner
Donald C. Wells

The accredited program in Civil Engineering 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 three options: the general civil engineering option; the environmental engineering option, and the surveying engineering option.

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. The surveying engineering option offers the civil engineering student a background in the surveying profession and in developing precise measurements for the purpose of locating and designing civil engineering projects.

Student projects and field trips are utilized to demonstrate practical applications of classroom and laboratory theory and analysis. Interactions with professional engineering technical groups and societies offer excellent opportunities for student contact with experienced, practicing engineers.

Graduates are employed by governmental agencies at federal, state, and municipal levels and by engineering contractors, private consulting firms and in the areas of sales engineering, teaching, research, materials testing, city planning, and administration fields. Graduates of the program are prepared to do productive work in their first job as well as to develop within their profession throughout their engineering career. The curriculum is designed to prepare a student for direct entry into the engineering profession, professional registration, and for graduate school.

Students desiring to major in Civil Engineering should have a particularly high aptitude for science and mathematics, and incoming freshmen should have taken substantial college preparatory courses in these disciplines in high school. Incoming transfer students should have completed at least one year of college calculus and one year of college physics (with laboratory) prior to beginning the program at Cal Poly. The community college student planning to transfer into this department should consult a school counselor or his department to determine which courses meet the program requirements.

Civil Engineering students are encouraged to become active in the student chapter of the American Society of Civil Engineers, the Structural Engineers Association of Southern California and the Institute of Transportation Engineers. Qualified students are invited to join the student chapter of Chi Epsilon, the civil engineering honor society.

CORE COURSES FOR MAJOR *

(Required of all students)

Intro. to Civil Engineering	CE	122	(1)
Elem. Surveying	CE	134/144	(4)
Computers in Civil Engineering	CE	210	(2)
Comp. in CE Lab	CE	211	(1)
Structural Analysis I	CE	304	(4)
Structural Analysis II	CE	305	(4)
Structural Mechanics Lab	CE	306	(1)
Soil Mechanics	CE	323/324	(2)
Hydraulic Engineering	CE	332/342	(4)
Construction and Engineering Law	CE	403	(3)
Structural Design—Steel	CE	406	(3)
Steel Design Lab	CE	407	(1)
Struc. Design Rein. Conc.	CE	421	(4)
Structural Concrete Lab	CE	422	(1)
Foundation Engineering	CE	424	(3)
Water Supply Engineering	CE	431/441	(4)
Water Quality Engineering	CE	432/452	(4)
Senior Design Project	CE	461	(2)
Senior Design Project	CE	462	(2)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Strength of Materials	ME	218	(3)
Fluid Mechanics	ME	311	(3)

OPTION COURSES FOR MAJOR*

(Required for specific option)

GENERAL CIVIL ENGINEERING

Advanced Surveying	CE	220/230	(4)
Highway Engineering Design	CE	222/232	(4)
Transportation Engineering	CE	223/233	(4)
Structural Design: Timber	CE	43/435	(3)
Undergraduate Seminar	CE	463	(2)
Applied Electrical Engineering	ECE	232	(4)
Thermodynamics	ME	301	(4)
Upper Division Math Elective			(3)
U.D. Electives in Civil Engineering			(11)

ENVIRONMENTAL ENGINEERING

Aquatic Ecology	BIO	305	(4)
Air Pollution Problems	CHM	460	(3)
Env Resource Syst	CE	351/371	(4)
Indust & Radioactive Wastes	CE	434/444	(4)
Engineering Hydrology	CE	451/471	(4)
Coastal Engineering	CE	455	(4)
Solid Waste Mgmt	CE	457	(3)
Senior Seminar	CE	463	(2)
Applied Electrical Engineering	ECE	232	(4)
Thermodynamics	ME	301	(4)
Upper Division Math Elective			(3)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

SURVEYING ENGINEERING

Advanced Surveying	CE	220/230	(4)
Highway Engr. Design	CE	222/232	(4)
Surveying Computations	CE	240	(3)
Geodetic Satellite Surveying	CE	311	(4)
Land Survey Desc	CE	313	(3)
Boundary Control and Legal Principles	CE	322	(4)
Public Land Surveys	CE	331	(3)
Photogrammetry	CE	427/447	(4)
Engineering Hydrology	CE	451/471	(4)
Undergraduate Seminar	CE	463	(2)
Subdivision Engineering	CE	482/492	(3)

Support Courses

(Required of all Students)

Numerical Methods in Civil Engr	CE	450	(3)
General Chemistry Laboratory	CHM	152	(1)
Engineering Design Graphics	MFE	121	(2)
Calc of Several Variables	MAT	214	(3)
Differential Equations	MAT	216	(4)
General Physics	PHY	131	(3)
General Physics	PHY	133	(3)
General Physics Laboratory	PHY	151	(1)
General Physics Laboratory	PHY	153	(1)

General Education

Category I

Freshman English I	ENG	104	(4)
Technical Communication and Documentation	CE	361/381	(4)
Rhetoric & Aesthetics	SA	290	(4)

Category II

Anal Geom & Calculus	MAT	114	(4)
Anal Geom & Calculus	MAT	115	(4)
Anal Geom & Calculus	MAT	116	(4)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Laboratory	CHM	151	(1)
Life Science	BIO	110	(3)
General Physics	PHY	132	(3)
General Physics Laboratory	PHY	152	(1)

Category III

IIIb Elective.....(4)
IIIc Elective.....(4)

Category IV

IVb Elective.....(4)
IVc Elective.....(4)

Category V

Category V elective.....(4)

Category VI

AMC 201 or PLS 201.....(4)
AMC 202 or HST 202.....(4)

Category VII

Theory of Architecture and Urbanism	ARC	451	(4)
Technological Economics	CE	301	(4)
Geotechnology	GSC	321	(4)

Course Descriptions

All students in engineering and engineering technology curricula must satisfy the specified composition requirements prior to enrolling in any 300-level course in the College of Engineering. Lecture and laboratory courses listed together are to be taken concurrently.

CE 122 Introduction to Civil Engineering (1)

Fundamental concepts of civil engineering. The technical, professional, and social responsibilities of the civil engineer. 1 lecture-problems.

CE 134/144 Elementary Surveying/Laboratory (2/2)

Use and care of surveying instruments, fundamental surveying methods, traverse measurements, area computations, precise equipment and topographic mapping. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: MAT 106 or equivalent.

CE 210 Computers in Civil Engineering II (2)

Application and use of the IBM (or clone) personal computer in Civil Engineering with emphasis on creating technical reports. Software instruction includes a word processor, a spreadsheet, a graphics program and elemental DOS. 2 lecture-problems. Co-requisite: CE 211.

CE 211 Computers in Civil Engineering Laboratory (1)

Actual use of software applications on an IBM or compatible personal computer with emphasis on creating technical documents. Programming in appropriate language. 1 three-hour laboratory. Co-requisite: CE 210.

CE 220/230 Advanced Surveying/Laboratory (3/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisite: CE 122, 134.

CE 222/232 Highway Engineering Design/Laboratory (2/2)

Geometric design of highways; highway sub-structure design; roadway structural section; flexible pavement design; rigid pavement design; highway surface treatments and stabilization. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: CE 135.

CE 223/233 Transportation Engineering/Laboratory (3/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisite: CE 222 or consent of instructor.

CE 240 Surveying Computations (3)

Introduction to the theory of measurements in surveying. Error propagation in horizontal and vertical position. The analysis of surveying measurement errors. Error propagation in rectangular coordinate systems. Introduction to the techniques of least squares in the adjustment of surveying data. Least squares adjustment of triangulation, trilateration and traverse networks. The use of mini-computers in surveying. 3 lecture-problems. Prerequisite: CE 220.

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; determination of investment criteria for the practicing civil engineer. Construction, managerial and urban economics; accounting, depreciation, multiple alternatives, replacement, capital budgeting. 4 lecture-problems. Prerequisite: Junior standing.

CE 304 Structural Analysis I (4)

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. 4 lecture-problems. Prerequisite: ME 218.

CE 305 Structural Analysis II (4)

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. 4 lecture-problems. Prerequisite: CE 304.

CE 306 Structural Materials Laboratory (1)

Testing of structural elements and materials. 1 three-hour laboratory. Prerequisite: CE 305.

CE 311 Geodetic and Satellite Surveying (4)

Spherical trigonometry; cartesian and curvilinear coordinates; transformations; geodetic datums; geodetic position computation; major control network extension; satellite and terrestrial positioning system. 4 lecture-problems.

CE 313 Land Survey Descriptions (3)

History of land ownership and transfer of title; types of documents of land conveyance; forms of legal descriptions of public and private lands; interpretation of maps and documents for the physical survey location of land boundaries; principles of writing precise land boundary descriptions; study of easements; value of monuments. 3 lecture-problems.

CE 322 Boundary Control & Legal Principles (4)

Boundary retracement principles based on common laws. Emphasis on simultaneous conveyances, rancho lands, resurvey problems, and legal descriptions. 4 lecture-problems.

CE 323/324 Soil Mechanics/Laboratory (2/1)

Soil composition, description, and classification. Groundwater and seepage analysis. Stress analysis and stress-strain and strength properties. Consolidation and settlement analysis. Engineering properties of compacted fill. 2 lecture-problems, 1 three-hour laboratory. Prerequisite: ME 218.

CE 331 Public Land Surveys (3)

History of the general practice and rules for the survey of the Public Lands the Bureau of Land Management; System of Rectangular Surveys; Monumentation; Restoration of Lost or Obliterated Corners; Subdivision of Sections; Special surveys and instructions; Field Notes; Plats and Patents; Meander Lines and Riparian Rights (course fulfills a requirement of proposed degree program). 3 lecture-problems.

CE 332/342 Hydraulic Engineering/Laboratory (3/1)

Analysis and related design of pressure (pipe) flow. Open channel flow and special topics for civil engineers. Problems involving basic head loss equations, pipe in series and parallel, pipe networks, critical flow, uniform flow, non-uniform flow, pump stations and culverts. 3 lecture-problems. 1 three-hour laboratory. Prerequisite: ME 311.

CE 351/371 Environmental Resource Systems/Laboratory (3/1)

Discussion and analysis of basic environmental skills and selected topics for the environmental engineer. Elements include population projection, curve fitting, principles of environmental systems, food production, solid waste, energy topics and noise and air pollutions. Labs emphasize field trips. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: None.

CE 361/381 Technical Communication and Documentation/Laboratory (3/1)

Study and preparation of documents utilized by the practicing civil engineer. Oral presentations. Proposals and bidding, specifications, environmental impact reports, journalism, technical investigations, test reports, research and development, design reports. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ME 218, Junior standing.

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 Construction and Engineering Law (3)

Principles of construction law and interpretation of contract documents. Product liability, professional liability, surveying law, patents. Relationship of owner, engineer and contractor. Preparation of technical specifications. 3 lecture-problems. Prerequisite: CE 361, Senior standing.

CE 406 Structural Design—Steel (3)

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 lecture-problems. Prerequisite: CE 305.

CE 407 Steel Design Laboratory (1)

Laboratory projects involving design of truss members, columns, girders, connections, and integration of these elements into a complete structure. 1 three hour laboratory. Co-requisite: CE 406.

CE 421 Structural Design—Reinforced Concrete (4)

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. 4 lecture-problems. Prerequisite: CE 305, 406.

CE 422 Concrete Design Laboratory (1)

Composition, proportioning and testing of concrete mixes. Testing of model reinforced concrete beams. 1 three hour laboratory. Co-requisite: CE 421.

CE 424 Foundation Engineering (3)

Geotechnical analysis and structure analysis and design of foundations, including spread footings, mats, piers, and piles. Lateral earth pressures and design of cantilevel retaining walls. 3 lecture-problems. Prerequisites: CE 323, CE 421.

CE 427/447 Photogrammetry/Laboratory (3/1)

Interpretation of aerial photographs. Stereoscopy. Application of aerial surveying to engineering problems, mapping. 3 lecture-problems, 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 lecture-problems. Prerequisite: CE 221 or consent of instructor.

CE 429/439 Traffic Engineering/Laboratory (3/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisite: CE 222.

CE 431/441 Water Supply Engineering/Laboratory (3/1)

Water pollutants and unit process treatment. Subjects include water quality, water uses, aeration, sedimentation, coagulation, flocculation, filtration, softening, disinfection, iron and manganese removal, and saline water conversion. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: CE 332.

CE 432/452 Water Quality Engineering/Laboratory (3/1)

Wastewater characteristics and unit process. Subjects include characteristics of wastewater, sewer design, requirements for disposal, preliminary treatment, biological processes, anaerobic digestion, sludge processing and oxygen sag. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: CE 431.

CE 433/435 Structural Design—Timber/Laboratory (2/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisite: CE 304.

CE 434/444 Industrial and Radioactive Wastes/Laboratory (3/1)

Source and treatment of industrial waste waters. Elements include materials of construction, volume reduction, neutralization, control and instrumentation, removal of suspended solids, common industrial processes. Major project and associated field trip required. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: CE 432.

CE 437/438 Slope Stability and Earth Dams/Laboratory (3/1)

Advanced analysis of seepage through soil and soil strength. Evaluation of the stability of earth slopes and design of stable slopes including the use of computer analysis methods. Design and construction of earth dams. Use of soil instrumentation. Field trips. 3 lecture-problems, one 3-hour laboratory. Prerequisite: CE 323.

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 lecture-problems. Prerequisite: CE 421.

CE 443/473 Pavement Design/Laboratory (3/1)

Properties of pavement components. Testing of asphaltic materials. Highway and airport pavement design for both flexible and rigid pavements. Introduction to pavement system management and maintenance. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: CE 222, CE 323.

CE 450 Numerical Methods in Civil Engineering (3)

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. 3 lecture-problems. Prerequisites: MAT 216 and CE 305.

CE 451/471 Engineering Hydrology/Laboratory (3/1)

Precipitation; weather modification; evaporation; infiltration; hydrographs; probability concepts; river and reservoir routing; groundwater; wells; flow nets; dam spillways; and storm drains. 3 lecture-problems, 1 three-hour problem session. Prerequisite: CE 332.

CE 453 Construction Engineering and Management (4)

Principles of construction engineering, techniques and management. Analysis and selection of equipment design of temporary support structures. Joint design. Construction planning and management, CPM, cost estimation, computer techniques, construction law. Use of construction tools and equipment. 3 lecture-problems, 1 three-hour laboratory.

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 lecture-problems. Prerequisite: CE 332 or consent of instructor.

CE 457 Solid Waste Management (3)

Elements include waste generation, storage, collection, transfer, transport, processing, recovery, and disposal. 3 lecture-problems. Prerequisites: Junior standing in Civil Engineering or consent of instructor.

CE 461, 462 Senior Design Project (2) (2)

Completion of a project typical of civil engineering under faculty supervision. Projects are presented in a formal report and are orally presented. Minimum 120 hours total time. Prerequisite: CE 463, Senior standing.

CE 463 Undergraduate Seminar (2)

Class discussions and student assignments relating career management, professional development and ethics to the civil engineering professional. Engineering judgment; decision-making; social issues. Formulation of senior project. 1 lecture, 1 three-hour laboratory. Prerequisite: CE 361, senior standing.

CE 482/492 Subdivision Engineering/Laboratory (3/1)

Engineering and surveying methods in land use planning, design, and construction. 3 lecture-problems, 1 three-hour laboratory.

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

Richard H. Cockrum, *Chair*
Robert L. Bernick
Jacob I. Castleman
Yi Cheng
David L. Clark
Mahmoud Davarpanah
M. Samy El-Sawah
Alan P. Felzer
Lloyd N. Ferguson, Jr.
Dennis J. Fitzgerald
Laurence D. Graham
Milton E. Hamilton
M. Kathleen Hayden
Richard J. Hermsen
Charles D. Hofmann
Hua K. Hwang
Robert G. Irvine
Alben C. Johnson
Herbert A. Johnson
Henslay W. Kabisama
Seog Y. Kang
Alexander E. Koutras
Anaiuppam R. Marudarajan
Mohammad A. Massoudi
Narayan R. Mysoor
Norman S. Nise
John P. Palmer
Mohamed Rafiquzzaman
Owen K. Skousen
Arthur W. Sutton Jr.
Wendy K. Wanderman

The Department of Electrical and Computer Engineering offers options in Computer Engineering, Electronic Engineering, and Electrical Engineering. These options, similar at the freshman and sophomore levels, diverge at the junior and senior levels into various areas of specialization. In addition to the options within the curriculum, the department offers six SPE's (Specified Program of Electives) in Power Engineering, Electronic Instrumentation and Measurement Science, Laser Electronics, Microwave Engineering, Process Control Electronics, and Robotics. Students may specify their Major Option Courses in one of these areas.

The department's principal objective is to provide a sound theoretical background along with current practical engineering knowledge to each student. The 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. Students are well prepared upon graduation to begin either their professional career or a program of graduate study.

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 students are prepared for employment in design and development, test and evaluation, and applied research.

Students desiring to major in Electrical and Computer Engineering should have a particularly high aptitude for science and mathematics, and incoming freshmen should have taken substantial college preparatory courses in these disciplines in high school. Incoming transfer students should have completed at least one year of college calculus and one year of college physics (with laboratory) prior to beginning the program at Cal Poly. The community college student planning to transfer into this department should consult a school counselor or his department to determine which courses meet the program requirements.

Electrical and Computer Engineering students are encouraged to become active in the student chapter of the Institute of Electrical and Electronic Engineers, the Cal Poly Amateur Radio Club, and the Korean-American Electrical Engineering Club. Qualified students are invited to join the student chapter of Eta Kappa Nu, the electrical engineering honor society.

PHYSIOLOGY MINOR

ECE majors specializing in Biomedical Engineering are encouraged to take the Physiology Minor. See the University Programs section of this catalog for details.

CORE COURSES FOR MAJOR *

(Required of all students)

Introduction to Electrical Engineering	ECE	109	(3)
PASCAL for Engineers	ECE	112	(3)
Introduction to Electrical Engineering Lab	ECE	129	(1)
Electronic Devices and Circuits	ECE	202	(4)
Introduction to Digital Systems I	ECE	204	(4)
Network Analysis I	ECE	208	(4)
Network Analysis II	ECE	209	(3)
Introduction to Power Engineering I	ECE	216	(2)
Electronics Lab	ECE	242	(1)
Introduction to Digital Systems I Lab	ECE	244	(1)
Network Analysis I Lab	ECE	252	(1)
Network Analysis II Lab	ECE	253	(1)
Electromagnetic Fields	ECE	302	(3)
Network Analysis III	ECE	307	(4)
Control Systems Engineering	ECE	309	(4)
Introduction to Communications Engineering	ECE	315	(4)
Introduction to Power Engineering II	ECE	316	(2)
Linear Active Circuit Design	ECE	321	(4)
Computer Simulation of Dynamic Systems	ECE	357	(1)
Control Systems Laboratory	ECE	359	(1)
Power Engineering Laboratory	ECE	366	(1)
Basic Active Circuits Lab	ECE	371	(1)
Communications Systems	ECE	405	(4)
Communications Lab	ECE	445	(1)
Senior Project	ECE	461	(2)
Senior Project	ECE	462	(2)
Undergraduate Seminar	ECE	463	(2)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

OPTION COURSES FOR MAJOR *

(Required for the Specific Option)

COMPUTER ENGINEERING

Computer Engineering I	ECE	341	(4)
Computer Engineering II	ECE	342	(4)
Computer Engineering III	ECE	343	(4)
Computer Engineering I Lab	ECE	391	(1)
Computer Engineering II Lab	ECE	392	(1)
Computer Engineering III Lab	ECE	393	(1)
Introduction to Data Structures	CS	233	(4)

Any 3 of the following courses:

Operating Systems	CS	431	(4)
State Machine Design	ECE	424/474	(4)
Selected Topics in Computer Engineering	ECE	425/475	(4)
Computer Organization and Programming	ECE	426/476	(4)
Advanced Digital Topics	ECE	427/477	(4)
Microcomputer Applications	ECE	432/482	(4)

ELECTRONICS ENGINEERING

Operational Amplifiers and Signal Conditioning	ECE	322	(4)
Instrumentation Systems	ECE	323/373	(4)
Introduction to Digital Systems II	ECE	331	(3)
Operational Amplifiers and Signal Conditioning Lab	ECE	372	(1)
Introduction to Digital Systems II Lab	ECE	381	(1)
Electromagnetic Field and Applications	ECE	406	(3)
R. F. Transmission Line Lab	ECE	446	(1)

Any 3 of the following courses:

Intro to Filter Design	ECE	403	(4)
Advanced Circuit Design	ECE	407/457	(4)
Digital Communication Systems	ECE	409	(4)
Microwave Eng'g (Lect./Lab)	ECE	410/460	(3+1)
Solid State Electronics	ECE	412	(4)
Integrated Circuit design	ECE	418	(4)
Lasers	ECE	420	(4)
Optical Fiber Communications	ECE	436	(4)
R.F. Design	ECE	448/498	(4)
ECE Electives			(2)

ELECTRICAL ENGINEERING

Suggested Specified Programs of Electives for Electrical Engineering Option

31 units of upper division ECE electives as follows:

Engr Design 7 units.

Engr Science or Design 24 units.

POWER ENGINEERING

Electromechanics I	ECE	317/367	(5)
Electromechanics II	ECE	318/368	(5)
Energy Conversion Systems I	ECE	421/451	(4)
Energy Conversion Systems II	ECE	422/452	(4)
Power Electronics I	ECE	468/478	(4)
Power Electronics II	ECE	469/479	(4)

ELECTRONIC INSTRUMENTATION AND MEASUREMENT SCIENCE

LASER ELECTRONICS

MICROWAVE ENGINEERING

PROCESS CONTROL ELECTRONICS

ROBOTICS

SUPPORT & DIRECTED ELECTIVES

Calc Sev Var	MAT	214	(3)
Calc Sev Var	MAT	215	(3)
Diff Equations	MAT	216	(4)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Matls Sci/Eng	MTE	207	(3)
General Physics	PHY	131	(3)
Gen Physics Lab	PHY	151	(1)
General Physics	PHY	133	(3)
Gen Physics Lab	PHY	153	(1)
Gen Chem Lab	CHM	152	(1)

GENERAL EDUCATION

Category I			
Freshman English I	ENG	104	(4)
Report Writing	COM	216	(4)
OR			
Egr Reports, Specs, and Proposals	ECE	311	(4)
Category II			
Analytic Geom & Calc	MAT	114	(4)
Analytic Geom & Calc	MAT	115	(4)
Analytic Geom & Calc	MAT	116	(4)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Lab	CHM	151	(1)
Life Science	BIO	110	(3)
General Physics	PHY	132	(3)
General Physics Lab	PHY	152	(1)
Category III			
Communication and Aesthetics	SA	290	(4)
Category IIIb Elective			(4)
Category IIIc Elective			(4)
Category IV			
Principles of Economics	EC	201	(4)
OR			
Principles of Economics	EC	202	
Political Sociology	SOC	290	(4)
OR	PLS	290	
Category V			
Category V Elective			(4)
Category VI			
American Civilization	AMC	201	(4)
OR			
Political Science	PLS	201	(4)
American Civilization	AMC	202	(4)
OR			
U.S. History	HST	202	(4)
Category VII			

Any University approved package except:

1) packages which include ECE "service" courses for other majors;
2) packages explicitly restricted to other majors (12)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Course Descriptions

All students in engineering and engineering technology curricula must satisfy the specified composition requirements prior to enrolling in any 300-level course in the College of Engineering. Lecture and laboratory courses listed together are to be taken concurrently.

CAUTION: Course descriptions show only immediate prerequisite courses, but those courses may in turn have prerequisite courses. It is the student's responsibility to be aware of all prerequisites for a course, direct and indirect.

ECE 109 Introduction to Electrical Engineering (3)

Introduction to the fundamental laws of electrical engineering, applications to circuit analysis, matrix methods. 3 lecture-problems. Prerequisite: MAT 114, concurrent ECE 129.

ECE 112 Pascal for Engineers (3)

Pascal computer programming for ECE. Problem-oriented computer language applications to electrical networks. 3 lecture-problems. 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. 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 Electronic Devices and Circuits (4)

Fundamentals of semiconductor devices. Characteristics of junction diodes, bipolar transistors, JFETs and MOSFETs. Basic biasing circuits. 4 lecture-problems. Prerequisites: ECE 109; MAT 216; PHY 133; CHM 111.

ECE 204 Introduction to Digital Systems I (4)

Characteristics and applications of the basic building blocks of digital systems. 4 lecture-problems. Prerequisite: ECE 112.

ECE 208 Network Analysis I (4)

An introduction to network analysis in the time domain with computer applications. 4 lecture-problems. Prerequisites: ECE 112; ECE 129; MAT 216; PHY 133.

ECE 209 Network Analysis II (3)

An introduction to network analysis in the frequency domain with computer applications. Continuation of ECE 208. 3 lecture-problems. Prerequisite: ECE 208.

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. 2 lecture-problems. Prerequisite: ECE 208.

ECE 231/251 Elements of Electrical Engineering/Laboratory (3/1)

Electrical principles, DC and AC circuit analysis, simple transients, three phase circuits, magnetics and transformers for non-electrical engineering majors. 3 lecture-problems, 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. 4 lecture-problems. 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 lecture-problems.

ECE 242 Electronics 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 Digital Systems I Lab (1)

Experiments demonstrating characteristics and applications of the basic building blocks of digital systems. One 3-hour laboratory. Prerequisite: ECE 129, 204.

ECE 252 Network Analysis I Lab (1)

Selected laboratory exercises in electrical networks. One 3-hour laboratory. Prerequisite: ECE 129. Concurrent or prerequisite: ECE 208.

ECE 253 Network Analysis II Lab (1)

Selected laboratory exercises in electrical networks. One 3-hour laboratory. Prerequisite: ECE 208, 252. Concurrent or prerequisite: ECE 209.

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 lecture-problems. Prerequisites: MAT 216, PHY 133.

ECE 307 Network Analysis III (4)

Analysis of network functions in the time and frequency domains. 4 lecture-problems. 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 lecture-problems. Prerequisite: ECE 216, 307.

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 lecture-problems. Prerequisites: ENG 104, ECE 321, 204, 216.

ECE 313/363 Electric Machines/Laboratory (2/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisite: MAT 116; PHY 133; ECE 231.

ECE 315 Introduction to Communications Engineering (4)

Analysis of random phenomena associated with the transmission of digital and analog signals. Analysis of random binary signals, optimum filtering, thermal noise, and signal to noise ratios. 4 lecture-problems. Prerequisites: ECE 307; MAT 215.

ECE 316 Introduction to Power Engineering II (2)

Network concepts in Power System Analysis, transformers, rotating AC machines, and fundamentals of Power System operation. 2 lecture-problems. Prerequisites: ECE 216, 209, 253.

ECE 317/367 Electromechanics I/Laboratory (4/1)

In depth treatment of magnetics, transformers and 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 lecture-problems. 1 three-hour laboratory. Prerequisites: ECE 316, 302, 366.

ECE 318/368 Electromechanics II/Laboratory (4/1)

Continuation of ECE 317 with emphasis on AC machine analysis, operation, and applications. 4 lecture-problems, 1 three-hour laboratory. 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 lecture-problems. Prerequisites: ECE 202. Prerequisite or concurrent ECE 307.

ECE 322 Operational Amplifiers and Signal Conditioning (4)

Elements of electronic circuit feedback. Operational amplifier systems. Waveshaping circuits and sources. 4 lecture-problems. Prerequisite: ECE 321.

ECE 323/373 Instrumentation Systems/Laboratory (3/1)

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 lecture-problems and 1 three-hour laboratory. Prerequisites: ECE 315, 322, 372.

ECE 325/375 Digital Electronics/Laboratory (3/1)

Device structures for primary logic families. Analysis of switching characteristics and waveform propagation. Structures of various memory devices, logic arrays, and display devices. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ECE 202, 204.

ECE 331 Introduction to Digital Systems II (3)

Functional blocks of a typical microcomputer. Register architecture, instruction sets, addressing modes, assembly language programming, basic input/output and interfacing. NOT FOR COMPUTER OPTION. 3 lecture-problems. Prerequisite: ECE 244. Concurrent: ECE 381.

ECE 333/383 Electronic Instrumentation and Control/Laboratory (3/1)

Principles and applications of transducers, readouts, rotational electromagnetic devices, instrumentation systems, amplifiers and signal conditioners, impedance matching, frequency, time response and elementary feedback systems. For non-electrical engineering majors. 3 lecture-problems. 1 three-hour laboratory. Prerequisites: ECE 231; MAT 216.

ECE 341/391 Computer Engineering I/Laboratory (4/1)

Analysis and design of Computer Engineering Systems. 4 lecture-problems, 1 three-hour laboratory. Prerequisites: ECE 204, 244. Concurrent: ECE 391.

ECE 342 Computer Engineering II (4)

Analysis and design of Computer Engineering Systems, including computer architecture. 4 lecture-problems. Prerequisite: ECE 341, 391; CS 233.

ECE 343/393 Computer Engineering III/Laboratory (4/1)

Analysis and design of Computer Engineering Systems, including microprocessors. 4 lecture-problems, 1 three-hour laboratory. Prerequisites: ECE 342, 392.

ECE 353/355 Computer Electronics I/Laboratory (3/1)

Basic principles and applications of diodes, transistors, MOS transistors. 3 lecture-problems and 1 three-hour laboratory. Prerequisites: PHY 133; CS 210. Not open to ECE majors.

ECE 354/356 Computer Electronics II/Laboratory (3/1)

TTL and MOS Logic Device Application. Arithmetic Logic Unit, register array and multiplexer/demultiplexer applications. Use of tristate gating. Bus systems. 3 lecture-problems, 1 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 Control Systems Laboratory (1)

Control system design assignments based upon the course work of ECE 309. Verification of design solutions through analog and digital simulations. 1 three-hour laboratory. Prerequisites: ECE 309, 357.

ECE 366 Power Engineering Laboratory (1)

Selected experiments in power engineering including magnetics, transformers, machinery and power network analysis. 1 three-hour laboratory. Prerequisite or concurrent: ECE 316.

ECE 371 Basic Active Circuit Lab (1)

Design and evaluation of basic amplifier circuits, single and multistage. 1 three-hour laboratory. Prerequisite: ECE 242. Prerequisite or 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 381 Introduction to Digital Systems II Lab (1)

Programming and interfacing with a typical microcomputer. 1 three-hour laboratory. NOT FOR COMPUTER OPTION. Prerequisite: ECE 204, ECE 244. Concurrent: ECE 331.

ECE 392 Computer Engineering II Laboratory (1)

Experiments demonstrating analysis and design of Computer-Engineering Systems, including computer architecture. 1 three-hour laboratory. Prerequisites: ECE 342, 391.

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 Introduction to Filter Design (4)

An introduction to the design of passive and active filters. Sensitivity analysis. 4 lecture-problems. Prerequisite: ECE 307.

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 lecture-problems. Prerequisites: ECE 307, 315.

ECE 406 Electromagnetic Fields and Applications (3)

Electromagnetic fields and Maxwell's equations. Wave equations, reflection and scattering of waves. Transmission line equations and solutions. Impedance matching. 3 lecture-problems. Prerequisite: ECE 302. Concurrent: ECE 446.

ECE 407/457 Advanced Circuit Design/Laboratory (3/1)

Design and evaluation of advanced linear circuits utilizing state-of-the-art electronic devices. 3 lecture-problems and 1 three-hour laboratory. Prerequisites: ECE 322, 307, 372.

ECE 408 Introduction to Digital Signal Processing I (4)

An introduction to digital signal processing and digital filters. 4 lecture-problems. Prerequisite: ECE 307.

ECE 409 Digital Communication Systems (4)

Introduction to digital and data communication systems, sampling, modulation techniques, time division multiplexing, performance of digital communication systems. 4 lecture-problems. Prerequisites: ECE 405, 445.

ECE 410 Microwave Engineering (3)

Principles of waveguide devices, active microwave devices, and circuits. Scattering parameter techniques, FET amplifiers. Microwave generation. 3 lecture-problems. Prerequisites: ECE 406, 446.

ECE 412 Solid State Electronics (4)

Physics and technology of solid state electronic devices with emphasis on recent developments in the field. 4 lecture-problems. Prerequisite: ECE 322.

ECE 414/444 Microprocessor Applications in Process Control/Laboratory (3/1)

Process control fundamentals. Analog and digital signal conditioning, z-transformation techniques. Digital controller principles. Development of digital control algorithms for the conventional PI, PID controls. Distributed microprocessor control systems. 3 lecture-problems. 1 three-hour laboratory. Prerequisites: ECE 309, 359, 323 and either 331/381 or 343/393.

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 lecture-problems. 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 lecture-problems. Prerequisites: ECE 302.

ECE 421/451 Energy Conversion Systems I/Laboratory (3/1)

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 lecture-problems. 1 three-hour laboratory. Prerequisites: ECE 318, or 316 plus permission of instructor.

ECE 422/452 Energy Conversion Systems II/Laboratory (3/1)

System stability and fault conditions, specific design considerations, load flow studies, economic operation practices. Standards and requirements governing industrial and utility system operations. 3 lecture-problems. 1 three-hour laboratory. Prerequisite: ECE 421.

ECE 424/474 State Machine Design/Laboratory (3/1)

Analysis and design of synchronous and asynchronous state machines. 3 lecture-problems, 1 three-hour lab. Prerequisites: ECE 343, 393; CS 233.

ECE 425/475 Selected Topics in Computer Engineering/Laboratory (3/1)

Selected Topics in Computer Engineering including design of controllers using bit slice architecture. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ECE 424.

ECE 426/476 Computer Organization and Programming/Laboratory (3/1)

Advanced concepts of computer and firmware engineering topics, such as architecture, instruction sets, system internals and effective programming techniques shall be discussed in depth. The laboratory component will consist of assembly language programming on both the PDP-11 and VAX-11. 3 lecture-problems; 1 three-hour laboratory. Prerequisite: ECE 393.

ECE 427/477 Advanced Digital Topics/Laboratory (3/1)

Theory and standards for interfacing LSI and VLSI digital subsystems. Organization of selected VLSI subsystems. 3 one-hour lecture-problems; 1 three-hour laboratory. Prerequisite: ECE 392.

ECE 428 Digital Signal Processing II (4)

A continuation of digital filter design and an introduction to digital signal processing algorithms. 4 lecture-problems. Prerequisite: ECE 408.

ECE 432/482 Microcomputer Applications/Laboratory (3/1)

Microcomputer applications at the systems level. Course to include usage of both hardware and software design aids. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ECE 343, 393.

ECE 434 Ocean Electronics (4)

Electronic Instrumentation for basic underwater measurements of ocean depths, currents, wave motion, salinity, water analysis, etc. Data buoy instrumentation systems. Basic ocean surface electronics for communication, navigation, weather, underwater acoustics transducers. 4 lectures and one or more ocean field trips. Prerequisite: 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 lecture-problems. Prerequisites: BIO 110; 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 lecture-problems. Prerequisites: ECE 302, 322.

ECE 445 Communications Lab (1)

Demonstrations of the individual aspects of communication technique. 1 three-hour laboratory. Prerequisite: 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. Prerequisite: ECE 302. Concurrent: ECE 406.

ECE 448/498 R.F. Design/Laboratory (3/1)

Principles of R.F. design of transmitters and receivers utilizing solid state electronics devices and integrated circuits. Design of oscillators, power amplifiers, mixers and detectors. 3 lecture-problems and 1 three-hour laboratory. Prerequisites: ECE 322, 406 or consent of instructor.

ECE 460 Microwave Measurements (1)

Electronic measurement equipment and techniques for measurements at microwave frequencies of such quantities as power, impedance, standing wave ratio and frequency, and impedance matching. Frequency domain reflectometry. Gunn oscillator characteristics. 1 three-hour laboratory. Prerequisites: ECE 406 and 446. Prerequisite or 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 one-hour lecture/problem solving sessions. Prerequisites: Completion of all 100–200 level courses, and all but 12 units of required 300 level courses. Satisfactory completion of Graduate Writing Test. Must be within 50 units of completing overall unit requirements for graduation.

ECE 468/478 Power Electronics I/Laboratory (3/1)

Basic Principles of Power Semiconductor Switching with emphasis on analysis and design criteria of D.C. voltage controllers, controlled rectifiers and converters. Selected applications to electrical machines and controls. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ECE 242, 316.

ECE 469/479 Power Electronics II/Laboratory (3/1)

Continuation of ECE 468 with emphasis on the analysis and design criteria of D.C. to D.C. converters (choppers), D.C. to A.C. inverters, and A.C. to A.C. converters. Selected control schemes and applications. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ECE 317, 468.

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

Edward V. Clancy, *Chair*
Thomas Aldington
Donald E. Breyer
John S. Buhr
Fazal B. Kauser
Lyle B. McCurdy
Earl E. Schoenwetter
G. Fred Sheets
Paul Stymelski
Thomas O. Tice

Accredited by the Technology Accreditation Commission of ABET, the program in Engineering Technology consists of an integrated curriculum designed to prepare graduates for technical careers in industry. It emphasizes the application of established scientific and engineering knowledge and methods to the solutions of technical problems in support of engineering activities. Fundamentals and applications of engineering principles are reinforced in the laboratory where students verify principles and learn to use instruments and equipment applicable to their specific fields of interest.

High school graduates and community college transfer students with an aptitude in algebra, trigonometry, and the physical sciences, along with an interest in applications of technology, are encouraged to apply to the program. Students desiring to major in Engineering Technology should have a good aptitude for science and mathematics, and incoming freshmen should have taken college preparatory courses in these disciplines in high school. Incoming transfer students should have completed two quarters of technical calculus and two quarters of college physics (with laboratory) prior to beginning the program at Cal Poly. All students should contact a program advisor to obtain assistance in developing their educational goals prior to actually starting their coursework. Each student enrolled in the program will work with an advisor to coordinate the student's specific program of studies. A minimum of 202 quarter units is required to complete the program.

Graduates of accredited bachelor programs in engineering technology are called "engineering technologists" and are most often members of the engineering team consisting of the engineer, the engineering technologist, and the engineering technician. The engineering technologist is applications oriented with a background in applied mathematics including concepts and applications of calculus; in the physical sciences; and in a particular technical specialization.

Engineering Technology students are encouraged to join the Southern California Engineering Technologists Association (SCETA) and the student chapter of the Associated General Contractors. Qualified students are invited to join the student chapter of Tau Alpha Pi, the engineering technology honor society.

ELECTRONICS AND COMPUTERS OPTION

This option is oriented toward linear and digital electronics, logic systems, computers, instrumentation and metrology, and electronic communications. Graduates may be involved in applied design, production engineering, test and evaluation engineering, among other activities.

CONSTRUCTION OPTION

This option is oriented towards the building construction and the medium-to-heavy construction industry. Graduates may be involved in construction project management, design of structures, construction surveys, project layouts, estimating and bidding construction projects, developing and maintaining construction records, and testing of construction materials.

GENERAL OPTION

This option is comprised of Aerospace, Mechanical and Manufacturing emphasis areas. The Aerospace emphasis area is oriented toward the application of aerodynamics, propulsion, structures, and stability and control in the design of aircraft and aerospace structures. Graduates may be involved in applied design, development, production, and testing of airplane and aerospace systems.

The Manufacturing emphasis area stresses technological competency and managerial skills in the economical utilization of raw material and resources through planning, selecting, and organization of manufacturing processes. Graduates may be involved with mass production, tooling, selection of machines and marketing of manufactured goods.

The Mechanical emphasis area stresses the application and design of mechanisms and power transmission systems utilizing strength of materials, metallurgy, statics, dynamics, fluid mechanics, thermodynamics and heat transfer. Graduates may be involved in applied design, development, application, or production of mechanical devices and systems.

CORE COURSES FOR MAJOR *

(Required of all students)

ETT 101 Computer Applications for ET ..... (3)
ETT 110/120 Applied FORTRAN ..... (4)
ETT 210 Applied Statics ..... (3)
ETT 460 Senior Seminar ..... (2)
ETT 461 Senior Project I ..... (2)
ETT 462 Senior Project II ..... (2)
MFE 121 Engineering Graphics ..... (2)
PHY 121 College Physics ..... (3)
PHY 141 College Physics Lab ..... (1)
PHY 123 College Physics ..... (3)
PHY 143 College Physics Lab ..... (1)
Mathematics electives chosen from approved list ..... (12)

Total core units in major ..... (38)

CONSTRUCTION OPTION REQUIRED COURSES *

ETC 101 Construction Engineering ..... (3)
ETC 102/112 Construction Drafting ..... (3)
ETC 131/141 Construction Surveying I ..... (4)
ETC 132 Construction Surveying II ..... (4)
ETC 202 Construction Materials ..... (3)
ETC 204 Construction Inspection ..... (3)
ETC 270/271 Electrical Installations ..... (4)
ETC 279/289 Engineering Cost Accounting ..... (3)
ETC 304 Construction Estimates I ..... (4)
ETC 305 Construction Estimates II ..... (4)
ETC 311 Structural Theory ..... (3)
ETC 312 Construction Equipment and Methods ..... (3)
ETC 315 Timber & Formwork Design ..... (4)
ETC 316 Steel Design ..... (3)
ETC 317 Concrete and Masonry Design ..... (3)
ETC 401 Construction Budgeting and Cost Control ..... (3)
ETC 402 Contracts and Specifications ..... (3)
ETC 403 Construction Safety ..... (3)
ETC 405 Construction Planning and Scheduling ..... (3)
ETC 406 Construction Organization and Management ..... (3)
ETC 411/421 Foundations and Soil Mechanics ..... (4)
ETC 431/441 Concrete Mix Design ..... (2)

REQUIRED SUPPORT COURSES FOR CONSTRUCTION OPTION *

ETT 220 Applied Strength of Materials ..... (4)
ETT 310 Applied Fluid Mechanics ..... (4)
MFE 125 Descriptive Geometry or MFE 210 Computer-Aided Drafting ..... (2)
xxx xxx Technical Electives ** ..... (3)

TOTAL UNITS FOR CONSTRUCTION OPTION ..... (85)

ELECTRONICS AND COMPUTERS OPTION REQUIRED COURSES *

ETE 102/152 Electrical Circuits I ..... (4)
ETE 103/153 Electrical Circuits II ..... (4)
ETE 203/253 Electronic Devices and Circuits I ..... (4)
ETE 204/254 Electronic Devices and Circuits II ..... (4)
ETE 210/260 Electrical Circuit Analysis ..... (4)
ETE 230/280 Introduction to Digital Logic ..... (4)
ETE 305/355 Electronic Devices and Circuits III ..... (4)
ETE 310 Applied Network Analysis ..... (4)
ETE 314/364 Linear Amplifier Circuits ..... (4)
ETE 315/365 Digital Logic Systems ..... (4)
ETE 318/368 Linear Integrated Circuits ..... (4)
ETE 340/390 Computer Organization ..... (4)
ETE 435/485 Communication Systems ..... (4)

REQUIRED SUPPORT COURSES FOR ELECTRONICS AND COMPUTERS OPTION *

ETT 211 Applied Dynamics ..... (3)
ETT 337 Materials Science for Electronics ..... (4)
ETP 272 Electronic Manufacturing and PCB Fabrication or MFE 201 Manufacturing Systems Processes ..... (4)
MFE 210 Computer-Aided Drafting ..... (2)
MAT 132 Technical Calculus ..... (4)
ETE xxx Lower-Division Technical Electives ** ..... (4)
ETx xxx Upper-Division Technical Electives ** ..... (8)

TOTAL UNITS FOR ELECTRONICS AND COMPUTERS OPTION ..... (85)

GENERAL OPTION *

(Covers Aerospace, Mechanical, and Manufacturing Areas)

Aerospace Emphasis Required Courses*

ARO 124 Aero Engineering Fund ..... (2)
ARO 125 Aero Engineering Fund ..... (2)
ETA 222 Aerospace Manufacturing Processes ..... (2)
ETA 301 Applied Aerodynamics ..... (4)
ETA 323 Wind Tunnel Testing ..... (2)
ETA 324 Applied Aerospace Structures ..... (4)
ETA 349 Aerospace Structures Laboratory ..... (2)
ETA 405 Principles of Flight ..... (4)
ETA 412 Applied Compressible Flow ..... (4)
ETA 415/425 Aerospace Powerplants ..... (5)
ETA 437/447 Applied Aircraft Design ..... (4)

Required Support Courses for Aerospace Emphasis *

ETT 201/251 Electrical Technology ..... (4)
ETT 211 Applied Dynamics ..... (3)
ETT 220/230 Applied Strength of Materials ..... (4)
ETT 234 Materials Joining ..... (2)
ETT 307 Engineering Materials ..... (4)
ETT 310/320 Applied Fluid Mechanics ..... (4)
ETE 321 Electronic Devices and Systems ..... (4)
ETM 306 Applied Thermodynamics ..... (4)
MFE 125 Descriptive Geometry ..... (2)
MFE 210 Computer-Aided Drafting ..... (2)
MFE 221 Manufacturing Processes—Metal Removal ..... (3)
MFE 230 Manufacturing Processes—Forming and Assembling ..... (3)
MAT 132 Technical Calculus ..... (4)
ETx xxx Upper-Division Technical Electives ** ..... (7)

TOTAL UNITS FOR AEROSPACE EMPHASIS AREA ..... (85)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major. In addition, a minimum of 32 units must be upper-division specialty area courses and must be completed at Cal Poly Pomona.
MAT 132 Technical Calculus III (4) is required for Aerospace, and Electronics & Computer Technology students.

** Select with advisor's approval.

Manufacturing Technology Emphasis
Required Courses *

ETP 276/286 Production Control ..... (4)
ETP 302 Industrial Safety ..... (3)
ETP 305 Manufacturing Engineering Technology Supervision ..... (3)
ETP 355 Production Machining I ..... (3)
ETP 375 Quality Assurance ..... (3)
ETP 377 Manufacturing Systems Engineering Methods ..... (3)
ETP 407 Manufacturing Engineering Value Analysis ..... (3)
ETP 408 Manufacturing Control ..... (3)

Required Support Courses for Manufacturing Emphasis *

ETT 201/251 Electrical Technology ..... (4)
ETT 211 Applied Dynamics ..... (3)
ETT 220/230 Applied Strength of Materials ..... (4)
ETT 234 Materials Joining ..... (2)
ETT 307 Engineering Materials ..... (4)
ETT 310/320 Applied Fluid Mechanics ..... (4)
IME 134/144 Molding and Casting ..... (2)
MFE 122 Advanced Engineering Design Graphics ..... (2)
MFE 125 Descriptive Geometry ..... (2)
MFE 201/211 Manufacturing Systems Processes ..... (4)
MFE 210 Computer-Aided Drafting ..... (2)
MFE 230 Forming and Assembling ..... (3)
MFE 324 Production Engineering I ..... (3)
MFE 350 Principles of Numerical Control ..... (3)
MFE 373 Tool and Die Technology ..... (3)
MFE 380 Manufacturing Metrology ..... (2)
MFE 475/480 Computer-Aided Manufacturing ..... (3)
xxx xxx Lower-Division Technical Electives** ..... (4)
xxx xxx Upper-Division Technical Electives** ..... (18)

Total Units for Manufacturing Emphasis Area ..... (85)

Mechanical Technology Emphasis Required Courses*

ETM 306 Applied Thermodynamics ..... (4)
ETM 308 Applied Heat Transfer ..... (3)
ETM 315/325 Machine Elements ..... (4)
ETM 320 Power Transmission Systems ..... (4)
ETM 324/344 Applied Mechanisms ..... (4)
ETM 330 Instrumentation Applications ..... (4)
ETM 410/420 Internal Combustion Engines ..... (3)
ETM 431 Selection and Application of Engineering Materials ..... (3)

Required Support Courses for Mechanical Emphasis *

ETT 201/251 Electrical Technology ..... (4)
ETT 211 Applied Dynamics ..... (3)
ETT 220/230 Applied Strength of Materials ..... (4)
ETT 234 Materials Joining ..... (2)
ETT 307 Engineering Materials ..... (4)
ETT 310/320 Applied Fluid Mechanics ..... (4)
IME 134/144 Molding and Casting ..... (2)
MFE 122 Advanced Engineering-Design Graphics ..... (2)
MFE 125 Descriptive Geometry ..... (2)
MFE 210 Computer-Aided Drafting ..... (2)
MFE 221 Manufacturing Processes-Metal Removal ..... (3)
MFE 222 Manufacturing Processes—Tool Selection ..... (2)
xxx xxx Lower-Division Technical Electives** ..... (8)
xxx xxx Upper-Division Technical Electives** ..... (14)

Total Units for Mechanical Emphasis Area ..... (85)

GENERAL EDUCATION

Category I—(12 units)
a) Freshman English I ..... ENG 104 (4)
b) Public Speaking ..... COM 100 (4)
c) Report Writing ..... COM 216 (4)

Category II—(19 units)
a) Technical Calculus ..... MAT 130 (4)
b) Technical Calculus ..... MAT 131 (4)
c) College Chemistry ..... CHM 104/141 (4)
d) Life Science ..... BIO 110 (3)
e) College Physics ..... PHY 122/142 (4)

Category III—(12 units)
a) Comm. & Aesthetics ..... SA 290 (4)
b) Category IIIb Elective ..... (4)
c) Category IIIc Elective ..... (4)

Category IV—(12 units)
a) Prin. of Econ. ..... 201 or 202 (4)
b) Category IVb Elective ..... (4)
c) Category IVc Elective ..... (4)

Category V—(4 units)
Category V Elective ..... (4)

Category VI—(8 units)
a) AMC 201 or PLS 201 ..... (4)
b) AMC 202 or HST 202 ..... (4)

Category VII—(12 units Upper Division)
a) ETT 305 or ETC 301 ..... (4)
b) Princ. of Org. Theo. & Beh. ..... MHR 301 (4)
c) Seminar in Environmental Economics ..... EC 435 (4)

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* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major. In addition, a minimum of 32 units must be upper-division specialty area courses and must be completed at Cal Poly Pomona.

** Select with advisor's approval.

Course Descriptions

All students in engineering and engineering technology curricula must satisfy the specified composition requirements prior to enrolling in any 300-level course in the College of Engineering. Lecture and laboratory courses listed together are to be taken concurrently.

ETT 101 Computer Applications for Engineering Technology (3)

Introduction to engineering technology. Use of the personal computer for engineering problem-solving and documentation via software application packages. Research paper required. 3 lecture-problem sessions. Prerequisites: Satisfactory score on the EPT or equivalent, and passing score on ELM and passing score on appropriate math diagnostic test or C or better in MAT 012.

ETT 110/120 Applied FORTRAN/Laboratory (3/1)

Introduction to structured programming using FORTRAN 77. Programming problems applicable to engineering technology. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETT 101, MAT 105, 106.

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 201/251 Electrical Technology/Laboratory (3/1)

Introduction to operation and application of basic electrical measuring instruments. D.C. and A.C. circuit applications involving resistance, inductance and capacitance. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ETT 101; MAT 105, 106; PHY 123. Not open to ETE majors.

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 lecture-problems. Prerequisite: ETT 101, MAT 130, PHY 121, PHY 121 and PHY 141.

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 lecture-problems. Prerequisite: ETT 101, ETT 210, MAT 131.

ETT 220/230 Strength of Materials for Engineering Technology/Laboratory (3/1)

Stress-strain diagrams, tension and compression, working stresses and factors of safety, torsion in shafts, stresses in beams, riveted joints, welded connections, columns. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ETT 101, ETT 210, MAT 131.

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, 470 Engineering Technology Internship (3) (3)

Specially assigned or approved on-the-job work activities in industry or other institutions related to student's educational program of studies. Formal report required. Prerequisites: full-time engineering technology related employment. Advance approval by internship coordinator required via a written proposal, and a letter of intent from the sponsoring company. Each course may be repeated once: maximum credit limited to 12 units.

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 Engineering Technology (4)

Principles and techniques of economics analysis of engineering and manufacturing projects. Costs and estimation, time value of money, economic evaluation criteria, basic comparative models, and replacement analysis. Consideration of income taxes, risk, and intangibles. Research papers and independent study required. 4 lecture-problems. Prerequisites: ETT 101, COM 219, EC 201, MAT 105.

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 lecture-problems, 1 three-hour laboratory. Prerequisite: CHM 104; ETT 220; MAT 130; PHY 121.

ETT 310/320 Applied Fluid Mechanics/Laboratory (3/1)

Applied principles of fluid flow. Properties of fluids. Fluid impulse and momentum. Viscous flow in pipes and open channels. 3 lecture-problems; 1 laboratory. Prerequisites: ETT 210; MAT 131; PHY 121.

ETT 337 Materials Science for Electronics (4)

Chemical and physical properties of semiconductor materials and specific solid-state devices. Manufacturing processes of solid-state devices. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETE 204, CHM 104, PHY 123, 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 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-discussion per week. Prerequisite: Senior standing, ETT 101, COM 100, COM 219, satisfaction of GWT.

ETT 461, 462 Senior Project I, II (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: ETT 460, senior standing, and consent of E.T. Department Chair.

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 the manufacturing of aerospace structures. Light metal forming, joining and riveting. Use of plastics, composites, ceramics and laminates. 2 three-hour laboratories. Prerequisites: MFE 230; ETT 234.

ETA 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.

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 lecture-problems. Prerequisites: ETT 101, ETT 211, 310; MAT 131; PHY 121.

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 lecture-problems. Prerequisite: ETT 110, 220; MAT 131.

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 lecture-problems. Prerequisite: ETA 301, ETT 211, ETT 310.

ETA 412 Applied Compressible Flow (4)

Introduction to the characteristics of aircraft and their components operating at high subsonic and supersonic speeds. Compressible flow characteristics through inlets, ducts and nozzles. Life and drag at high speeds, shock phenomena. Use of supersonic wind tunnel. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETA 301, ETM 306, MAT 132.

ETA 415/425 Aerospace Powerplants/Laboratory (4/1)

Analysis of turboprop, ramjet, turbojet, turbofan and rocket engines with respect to fuel burning performance, thermodynamic analysis, structural and mechanical requirements. Performance testing of jet engines. 4 lecture-problems, 1 three-hour laboratory. Prerequisite: ETT 310, ETA 301, ETM'306.

ETA 437/447 Applied Aircraft Design/Laboratory (2/2)

Phases of airplane design. Consideration of constraints and design methodology. Methods of optimizing design compromises. Conceptual design study of an airplane. 2 lecture-problems, 2 three-hour laboratories. Prerequisites: ETA 324, 405, 415; MFE 210.

ETA 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.

ETC 101 Construction Engineering (3)

Introduction to construction engineering problems. An overview of the construction engineering program, the scope of the field of construction engineering and the responsibilities of the construction engineer. Introduction to microcomputers and applications. 3 lecture-problems. Corequisite: MAT 105.

ETC 102/112 Construction Drafting/Laboratory (1/2)

Structural, topographic, plan and profile and surveying drawing practices. Line and lettering work, use of drafting machines and office practices are stressed. 1 lecture-problems, 2 three-hour laboratories. Prerequisite: MFE 121.

ETC 131/141 Construction Surveying I/Laboratory (2/2)

Fundamental surveying methods as applied to construction layout. Use of transit and level for location and control of structures. Vertical and horizontal control. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: MAT 105, 106.

ETC 132 Construction Surveying II (4)

Profile surveys; borrow pit and earthwork measurements and distribution analysis. Highway curves—horizontal and vertical. 2 lecture-problems. 2 three-hour laboratories. Prerequisite: ETC 131.

ETC 202 Construction Materials (3)

Properties of materials used in building and heavy construction. 3 lecture-problems. Prerequisite: ETC 101.

ETC 204 Construction Inspection (3)

Inspection responsibilities, authority, licensing and registration requirements related to heavy and building construction. 3 lecture-problems. Prerequisites: ETC 102, 202.

ETC 270/271 Electrical Installations/Laboratory (3/1)

Fundamentals of electrical equipment and installations as related to the construction industry. Electrical wiring, transformers, machines, illumination, heating, wiring codes and specifications. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: MAT 105, 106; PHY 123. Not open to ETE majors.

ETC 279/289 Engineering Cost Accounting/Laboratory (2/1)

Fundamental concepts, definitions and terminologies of engineering cost accounting. Basic techniques and policies commonly employed in engineering cost accounting systems by industry. 2 lecture-problems, 1 three-hour laboratory. Prerequisite: MAT 105.

ETC 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.

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 lecture-problems. Prerequisite: ETC 101, MAT 105.

ETC 304 Construction Estimates I (4)

Fundamentals of building construction estimating procedures, considering equipment, labor, material and overhead costs. 4 lecture-problems. Prerequisites: Junior standing, ETC 101, ETC 102, 202 and 204; MAT 105, 106.

ETC 305 Construction Estimates II (4)

Fundamentals of heavy construction estimating procedures considering equipment, labor, material and overhead costs. 4 lecture-problems. 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 lecture-problems. Prerequisite: ETT 220, MAT 131, PHY 121.

ETC 312 Construction Equipment and Methods (3)

Construction procedures, job planning layout, selection and application of construction equipment to building and heavy construction projects. 3 lecture-problems. Prerequisites: Junior standing, ETC 102; MAT 105, 106.

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 lecture-problems. 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 lecture-problems. 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 lecture-problems. Prerequisite: ETC 315.

ETC 401 Construction Budgeting and Cost Control (3)

Methods and procedures used in budgeting, procurement, and cost control of construction projects. Forecasting, monitoring, and appraisal of project cost performance through use of manual and computer techniques. 3 lecture-problems. Prerequisites: ETT 101, ETC 279.

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 lecture-problems. Prerequisite: Senior standing, ETC 101, 102, 202.

ETC 403 Construction Safety (3)

Logical problem solving using safety engineering in construction, considering safety legislation, OSHA. Safety programs, accident prevention and public safety. 3 lectures. Prerequisite: Senior standing, corequisite: ETC 312.

ETC 405 Construction Planning and Scheduling (3)

Methods and procedures used in planning and scheduling construction projects, utilizing graphic charts and PERT/CDM networks. Resource allocation and levelling through the application of manual and computer systems. 3 lecture-problems. Prerequisite: ETC 305 and 401.

ETC 406 Construction Organization and Management (3)

Theory and techniques of construction management and the general organizational structure of a contracting firm. Contractor's policies and procedures regarding the legal, financial, marketing, and personnel management as well as the everyday operations of a construction company and/or project. 3 lecture-problems. Prerequisite: ETC 405.

ETC 411/421 Foundations and Soil Mechanics/Laboratory (3/1)

Selection and methods of installation of foundations and other soil-supported structures. Footings, piles, caissons, retaining structures, soil embankments and fills. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ETC 311.

ETC 431/441 Concrete Mix Design/Laboratory (1/1)

Theory and practice of concrete materials and the methods utilized in the mix design, production, placement and testing of structural concrete. 1 lecture-problem, 1 laboratory. Prerequisites: Senior standing, ETC 202; MAT 105, 106; PHY 121.

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 lecture-problems, 1 three-hour laboratory. Prerequisite: ETC 431.

ETC 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.

ETE 102/152 D-C Circuit Analysis/Laboratory (3/1)

Principles of electric circuit elements including resistance, capacitance and inductance; magnetism. Basic d-c network theorems and transient analysis. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ETT 101, MAT 105.

ETE 103/153 A-C Circuit Analysis/Laboratory (3/1)

Phasor analysis in a-c circuits. Basic a-c circuit theorems. D-C Transients. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETT 101, ETE 102; MAT 105, 106.

ETE 203/253 Electronic Devices and Circuits I/Laboratory (3/1)

Introduction to the theory of semiconductor junction devices. Characteristics and operation of diode and bipolar junction transistors; d-c characteristics, biasing, and d-c stability. Basic device applications. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETT 101, ETE 103; MAT 105, 106.

ETE 204/254 Electronic Devices and Circuits II/Laboratory (3/1)

Introduction to FET theory and operation, d-c characteristics and biasing. BJT and FET small signal models. Analytical and graphical analysis of single-stage amplifiers at midband; d-c and a-c load lines, gain, input-output impedance. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETT 101, ETE 203; MAT 105, 106.

ETE 210/260 Electrical Circuit Analysis/Laboratory (3/1)

Frequency response in RLC circuits; transfer functions, Bode plots, filters. Introduction to 3-phase circuits. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETT 101, ETE 103; MAT 131.

ETE 215/265 Electronic Circuits/Laboratory (4/1)

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. Primarily for transfer students who have a basic knowledge of transistors. 4 lecture-problems, 1 three-hour laboratory. Prerequisite: Community college course in electronic devices, MAT 105, 106; PHY 123.

ETE 230/280 Introduction to Digital Logic/Laboratory (3/1)

Introduction to applied Boolean algebra and number systems. Logical building blocks—gates, and memory elements. Logic circuit families. Applied design and laboratory. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ETE 204.

ETE 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 maximim of 4 units per quarter. Prerequisites: Permission of instructor. Instruction is by lecture, laboratory, or a combination of both.

ETE 305/355 Electronic Devices and Circuits III/Laboratory (3/1)

BJT and FET high frequency models. Frequency effects of coupling, bypass, and interelectrode capacitances upon gain and input-output impedance of single stage BJT and FET amplifiers. Bode plots. Differential amplifiers. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETT 101; ETE 204, 210; MAT 131.

ETE 310 Applied Network Analysis (4)

Transient Analysis, transfer functions, frequency response. Computer methods utilized. 4 lecture-problems. Prerequisites: ETT 101; ETE 210; MAT 132.

ETE 314/364 Linear Amplifier Circuits/Laboratory (3/1)

Analysis of multistage and large signal amplifiers. Frequency response. Ideal and non-ideal negative feedback amplifiers and their characteristics. Oscillators. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETT 101; ETE 305; MAT 131.

ETE 315/365 Digital Logic Systems/Laboratory (3/1)

Digital circuit analysis and design using registers and counters. Sequential networks. Implementation of binary operations. Semiconductor memories. A-D and D-A conversions. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ETE 230.

ETE 318/368 Linear Integrated Circuits/Laboratory (3/1)

Characteristics of operational amplifiers. Basic applications and classical circuits. Frequency response. D-C and a-c errors and compensation. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETE 314; MAT 131.

ETE 319/369 Linear Circuit Applications/Laboratory (3/1)

Practical applications of currently available monolithic circuit devices in linear and digitally-related linear electronic circuits. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ETE 318.

ETE 321/371 Electronic Devices and Systems/Laboratory (3/1)

A study of linear and digital electronic devices, circuits, and instruments as related to measurement, amplification, and control of electromechanical systems. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: PHY 123, ETT 201. Not open to ETE majors.

ETE 340/390 Computer Organization/Laboratory (3/1)

Generalized registers, arithmetic logic units and bus organization. Memory system principles, computer peripherals. Basic system architecture. Micro program control and microcoding. System project. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ETE 315.

ETE 360 Electronic Systems Reliability (4)

Theory of electronic troubleshooting, special testing methods, failure diagnosis system reliability. Component operational theory. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETE 318; STA 107.

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 lecture-problems, 1 three-hour laboratory. Prerequisites: ETE 318; STA 107.

ETE 425 Electronic Precision Measurements (4)

Electronic precision measurement techniques. Typical experiments. Calibration; measurements of precision on electrical equipment of parameters. Basic electrical and magnetic test equipment; basic standards. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ETE 420.

ETE 435/485 Communication Systems/Laboratory (3/1)

The study of periodically gated, amplitude, single sideband, and frequency modulation methods involved in communications systems. Receivers and telemetry systems. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETE 314, MAT 132.

ETE 437/487 RF Measurements/Laboratory (3/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisites: ETE 435; MAT 132.

ETE 438/488 Microwave Techniques/Laboratory (3/1)

Microwave safety, generation, transmission, wave guides, wave guide components and measurements. Microwave measurement systems and techniques. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: MAT 131; ETE 437.

ETE 442/492 Digital Data Communications/Laboratory (3/1)

Digital communication concepts and techniques; information codes; error detection codes; line control procedures; modes of transmission; concentrators and distributed intelligence. 3 lecture-problems. 1 three-hour laboratory. Prerequisite: ETE 444.

ETE 444/494 Microprocessors/Laboratory (3/1)

Microcomputer organization, operation, and assembly-language programming. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETT 110; ETE 340.

ETE 445/495 Microprocessor Applications/Laboratory (3/1)

Microcomputer interfacing; consideration of analog effects upon digital signals. Digital hardware, peripheral equipment and bus standards. 3 lecture-problems. 1 three-hour laboratory. Prerequisite: ETE 444.

ETE 446/456 Switching Circuits and Devices/Laboratory (3/1)

Analysis of circuits operating in a switched mode. Waveshaping, timing, and logic families. Special devices, A-D and D-A converters. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETT 101; ETE 230, 305; MAT 131.

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 lecture-problems. Prerequisites: ETE 314; ETT 307; PHY 123; MAT 132.

ETE 480 Biomedical Electronics (4)

An introduction to biomedical engineering overview of basic physiological parameters and measurement techniques; transducers, electrodes and available systems; testing standards and codes; safety. 3 lecture-problems. 1 three-hour laboratory. Prerequisite: ETE 318.

ETE 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.

ETM 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.

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 lecture-problems. Prerequisites: PHY 122; ETT 211; ETT 310, MAT 131.

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 lecture-problems. Prerequisite: ETM 306, MAT 131.

ETM 315/325 Machine Elements/Laboratory (3/1)

Practical application of the fundamentals of mechanics and strength of materials to the design of machine elements with emphasis on computer aided design solution-problems. 3 lecture-problems, 1 three hour lab. Prerequisites: ETT 110, 220; MAT 131; PHY 121.

ETM 320/340 Power Transmission Systems/Laboratory (3/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisite: ETM 315.

ETM 324/344 Applied Mechanisms/Laboratory (3/1)

A study of the elements of mechanisms; cams, gears, kinematics. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETT 211; MFE 121; MAT 131; PHY 121.

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 lecture-problems, 1 three-hour laboratory. Prerequisites: PHY 123; ETT 201; MAT 105, 106.

ETM 334 Applied Heating and Air Conditioning (4)

Thermal environmental requirements for human habitation. Psychrometrics. Building heating and cooling loads. Air-handling equipment. 4 lecture-problems. Prerequisite: ETM 306.'

ETM 335/345 Heating and Air Conditioning/Laboratory (3/1)

Heating equipment; refrigeration systems and equipment. Design of a complete system of compatible components for the control of thermal environment. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ETM 334.

ETM 410/420 Internal Combustion Engines/Laboratory (2/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisite: ETM 306.

ETM 431 Selection and Application of Engineering Materials (3)

Structural and phase changes resulting from plastic deformation and thermal treatments of metals, polymers, and engineering ceramics; their applications and properties. Economic selection of materials and processing. 3 lecture-problems. Prerequisites ETT 307, MAT 131.

ETM 436/446 Air Conditioning Systems/Laboratory (3/1)

Air conditioning system types and characteristics; criteria for selection of system type; air conditioning system controls; safety and building code requirements. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ETM 335.

ETM 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.

ETP 272/282 Electronic Manufacturing and PCB Fabrication/Laboratory (3/1)

Manufacturing and fabrication processes associated with the electronics industry. High-reliability testing. Bonding, joining, cabling techniques. PCB artwork and manufacturing techniques. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ETE 204, MFE 121, 210.

ETP 276/286 Production Control/Laboratory (3/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisites: MFE 221, 230.

ETP 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.

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 lecture-problems. Prerequisite: Junior standing.

ETP 305 Manufacturing Engineering Technology Supervision (3)

A study of technological and professional specialization in engineering supervision. 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 lecture-problems. Prerequisite: Junior standing, ETT 305.

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 lecture-problems. Prerequisite: ETP 305.

ETP 355, 356 Production Machining I, II (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 lecture-problems, 1 three-hour laboratory. Prerequisite: MFE 222.

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 lecture-problems, 1 three-hour laboratory. Prerequisite: MFE 230.

ETP 371/391 Production and Facilities Planning/Laboratory (3/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisite: ETP 276, ETT 305.

ETP 375 Quality Assurance (3)

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. 3 lecture-problems. Prerequisite: STA 107.

ETP 377 Manufacturing Systems Engineering Methods (3)

Analysis, application and computation of statistical methods and mathematical programming procedures as applied to engineering and industrial systems. Use of computer and software packages. 3 lecture-problems. Prerequisites: ETT 101, ETT 110, MAT 131, STA 107.

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-problem, 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 lecture-problems. 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 engineering. 3 lecture-problems. Prerequisite: ETP 307.

ETP 405 Manufacturing Engineering Material Management (3)

Problems of manufacturing engineering material management referenced to the total integrated system of converting raw material into a finished product. 3 lecture-problems. Prerequisite: Senior standing, ETT 305.

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 lecture-problems. Prerequisite: Senior standing, ETT 101, 305.

ETP 408 Manufacturing Control (3)

Problem of the various phases of starting up, operating, and maintaining an owner-managed manufacturing company. Emphasis on economic justification of alternate courses of action open to the manufacturing entrepreneur. 3 lecture-problems. Prerequisite: Senior standing, ETT 305.

ETP 437, 438 Nondestructive Evaluation I, II (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-problem, 1 three-hour laboratory. Prerequisite: ETT 307.

ETP 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.

INDUSTRIAL AND MANUFACTURING ENGINEERING

Andy R. Bazar, *Chair*
Kamran Abedini
Klaus D. Bauch
Bratcher L. Bright
Farouk Darweesh
Biman K. Ghosh
Leonhard M. Meyers
John D. O'Neil
Parviz Rashti
Phillip R. Rosenkrantz
Abdul B. Sadat
J. Garrard Wright
Donald G. Zook

The department offers two degree programs, one in Industrial Engineering and one in Manufacturing Engineering. Each program prepares the students for both engineering practice and for graduate study. The Industrial Engineering major is concerned with the most effective methods of utilizing and integrating people, materials, and equipment in both production and service organizations. The Manufacturing Engineering major is concerned with the most effective ways of designing and developing manufacturing systems.

Students desiring to major in either Industrial or Manufacturing Engineering should have a particularly high aptitude for science and mathematics, and incoming freshmen should have taken substantial college preparatory courses in these disciplines in high school. Incoming transfer students should have completed at least one year of college calculus and one year of college physics (with laboratory) prior to beginning the program at Cal Poly. The community college student planning to transfer into this department should consult a school counselor or his department to determine which courses meet the program requirements.

Graduates of the program are prepared to do productive work in their first jobs 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.

Industrial Engineering

Industrial Engineering is a dynamic profession with credible growth and increasing importance. Industrial engineers use engineering principles to develop integrated systems of people, materials, and equipment. As problem solvers, industrial engineers are equipped with practical and scientific tools to tackle complex industrial problems and to increase the productivity of workers, capital, and facilities. Industrial engineers are educated to provide valuable service to management in questions regarding the best use of people, materials, equipment, and energy. They are the engineers who design and implement productivity and quality improvement methods for industry.

The accredited industrial engineering curriculum provides a broad background in humanities and social sciences, mathematics, physical sciences, engineering science, analysis, design, and systems. It provides a good balance between the traditional industrial engineering subjects and the most recent developments in the discipline. Industrial engineering students take courses in work analysis and design, process design, human factors, facilities planning and layout, engineering economic analysis, production planning and control, systems engineering, computer utilization and simulation, operations research, quality control, automation, robotics, and productivity engineering. The program is designed to provide the student with a good foundation of basic concepts and principles in addition to applied engineering techniques. The department and university laboratories and equipment, including computers, are integrated into the coursework throughout the program.

Industrial Engineering students are encouraged to join the Cal Poly Pomona chapter of the Institute of Industrial Engineers. Eligible students may be invited to join the student chapter of Alpha Pi Mu, the 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	128/138	(4)
Work Analysis and Design	IE	224/234	(4)
Fundamentals of Human Factors Engr.	IE	225/235	(4)
Indus Engr Math Anal	IE	311	(3)
Ele of Ind Engr Sys	IE	327/337	(4)
Facilities Planning, Layout & Design	IE	331/341	(4)
Oper Research I	IE	416	(4)
Oper Research II	IE	417	(4)
Industrial System Design	IE	429	(4)
Industrial Engr electives †			(8)
Operations Planning and Control	IE	436/446	(3)
Industrial & Manufacturing Engineering Fund	IME	111/121	(4)
Indus Costs and Controls	IME	239	(3)
Production Plng and Control	IME	326	(3)
Quality Control by Stat Meth	IME	415	(4)
Industrial Computer Sys	IME	428	(4)
Senior Project	IME	461	(2)
Senior Project	IME	462	(2)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Gen Chem Lab	CHM	152	(1)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

† Select from approved list.

Elem Elec Engr	ECE	231/251	(4)
Elec Inst & Con	ECE	333/383	(4)
Engineering Prob & Stat	IE	312	(3)
Undergrad Seminar	IME	460	(2)
Calc of Sev Var	MAT	214	(3)
Calc of Sev Var	MAT	215	(3)
Differential Eqm	MAT	216	(4)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Strength Matls	ME	218	(3)
Strength Matls	ME	219	(3)
Engr Des Graphics	MFE	121	(2)
Principles of Robotics	MFE	455/485	(3)
Matls Sci & Engr	MTE	207	(3)
General Physics	PHY	131	(3)
General Physics	PHY	133	(3)
General Physics Laboratory	PHY	151	(1)
General Physics Laboratory	PHY	153	(1)
Stat Meth Engr & Phy Sci	STA	309	(3)

GENERAL EDUCATION

(Required of all students)

CATEGORY I

Freshman English I	ENG	104	(4)
Com & Aesth	SA	290	(2)
Report Writing	COM	216	(4)

CATEGORY II

Analytical Geometry & Calculus	MAT	114	(4)
Analytical Geometry & Calculus	MAT	115	(4)
Analytical Geometry & Calculus	MAT	116	(4)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Lab	CHM	151	(1)
Life Science	BIO	110	(3)
General Physics	PHY	132	(3)
General Physics Lab	PHY	152	(1)

CATEGORY III

IIIa Com & Aesth	SA	290	(2)
IIIb Ethics & Engr Dec Mkng	CPU	401	(4)
IIIc any course			(4)

CATEGORY IV

Principles of Economics *or* EC 202	EC	201	(4)
IVb Elective			(4)
IVc Elective			(4)

CATEGORY V

Category V Any course			(4)

CATEGORY VI

American Civilization *or*

Intro to American Government	AMC/PLS	201	(4)
American Civilization or U.S. History	AMC/HST	202	(4)

CATEGORY VII

Engr Economic Decision Analysis	IE	401	(4)
Product Liability & Ethics	EGR	401	(4)

Manufacturing Engineering

The Manufacturing Engineering program contains a unique, well balanced curriculum designed to prepare the student for a fast and productive entry into today's complex manufacturing environments. The program is the only one of its kind in California and is well received by the industrial community. Manufacturing engineers plan, develop, and optimize the process and systems of production. They improve manufacturing productivity by developing better methods of assembling, testing, and fabricating systems and products.

Manufacturing engineering students are given a solid foundation in production processes and techniques, properties of materials, computers and automation management, and professional communication. These building blocks are then combined and studied as manufacturing systems and then related to the most recent manufacturing technologies. What makes the manufacturing engineering program unique is the fact that it is designed to help the students apply what they have learned through lab assignments, projects, field trips, trade shows, and co-op work. Students get lab experience in metal removal processes, forming and assembly, computer, numerical control, robotics, CAD/CAM, and plastics engineering.

Manufacturing engineering graduates are in demand by all types and sizes of manufacturing companies because of their diversified training in traditional as well as new areas of manufacturing knowledge. The rapid growth of new technologies in computer-integrated manufacturing, robotics, lasers, artificial intelligence, and composites have opened a whole new world of opportunities for manufacturing engineers. The trend in industry is toward utilizing design engineers and manufacturing engineers as a team in order to produce more economical and functional products.

Manufacturing engineering students are encouraged to join the student chapter of the Society of Manufacturing Engineers. There are also student chapters of the American Foundrymen's Society and the Institute of Industrial Engineers.

CORE COURSES FOR MAJOR *

(Required of all students)

Work Analysis and Design	IE	224/234	(4)
Facilities Planning, Layout & Design	IE	331	(4)
Industrial and Manufacturing Engineering Fund	IME	111/121	(4)
Industrial Costs and Controls	IME	239	(3)
Production Planning and Control	IME	326	(3)
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	(3)
Manufacturing Processes-Form & Assembly	MFE	230	(3)
Production Engineering I	MFE	324	(3)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Production Engineering II	MFE	325	(3)
Principles of Numerical Control	MFE	350	(3)
Manufacturing Metrology	MFE	380	(2)
Manufacturing Operations Analysis	MFE	421	(3)
Principles of Robotics	MFE	455/485	(3)
Metal Working Theory & Applications	MFE	465/495	(3)
Process Electives (select from approved list)			(4)
Automated Manufacturing Electives (select from approved list)			(6)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Gen Chem Laboratory	CHM	152	(1)
Elem Elec Engr	ECE	231/251	(4)
Elec Inst & Control	ECE	333/383	(4)
Engineering Prob & Stat	IE	312	(3)
Undergraduate Seminar	IME	460	(2)
Calc of Sev Var	MAT	214	(3)
Calc of Sev Var	MAT	215	(3)
Differential Egn	MAT	216	(4)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Strength of Matls	ME	218	(3)
Strength of Matls	ME	219	(3)
Thermodynamics	ME	301	(4)
Fluid Mechanics	ME	311	(3)
Matls Sci & Engr	MTE	207	(3)
Gen Physics	PHY	131	(3)
Gen Physics	PHY	133	(3)
Gen Physics Laboratory	PHY	151	(1)
Gen Physics Laboratory	PHY	153	(1)
Stat Meth Engr & Phy Sci	STA	309	(3)

GENERAL EDUCATION COURSES

(Required of all students)

CATEGORY I			
Freshman Comp	ENG	104	(4)
Com & Aesth	SA	290	(2)
Report Writing	COM	216	(4)
CATEGORY II			
Analytical Geometry & Calculus	MAT	114	(4)
Analytical Geometry & Calculus	MAT	115	(4)
Analytical Geometry & Calculus	MAT	116	(4)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Lab	CHM	151	(1)
Life Science	BIO	110	(3)
General Physics	PHY	132	(3)
General Physics Lab	PHY	152	(1)
CATEGORY III			
IIIa Com &-Aesth	SA	290	(2)
IIIb Ethics & Engr Dec Mkng	CPU	401	(4)
IIIc Any course			(4)
CATEGORY IV			
Principles of Economics	EC	201	(4)
or EC 202			
IVb Elective			(4)
IVc Elective			(4)
CATEGORY V			
Category V elective			(4)
CATEGORY VI			
American Civilization *or* Intro to American Government	AMC/PLS	201	(4)
American Civilization *or* U.S. History	AMC/HST	202	(4)
CATEGORY VII			
Engr Economic Decision Analysis	IE	401	(4)
Product Liability & Ethics	EGR	401	(4)

Course Descriptions

All students in engineering and engineering technology curricula must satisfy the specified composition requirements prior to enrolling in any 300-level course in the College of Engineering. Lecture and laboratory courses listed together are to be taken concurrently.

IE 128/138 Process Design/Laboratory (3/1)

Development of the methods of manufacture and product design 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 lecture-problems, 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 lecture-problems. Prerequisite: IE 224.

IE 224/234 Work Analysis and Design/Laboratory (3/1)

Theory and application of work analysis as related to process design, facilities, workplace layout, tools and equipment and services. Analytical techniques of measurement of work content including stopwatch time study, standard data, predetermined time systems, and work sampling. 3 lecture-problems, 1 three-hour laboratory.

IE 225/235 Fundamentals of Human Factors Engineering/Laboratory (3/1)

Study of human physiological, biomechanical, and psychological characteristics and how they influence engineering and design of equipment, machines, products, facilities, tools, and environments. 3 lecture-problems, 1 three-hour laboratory.

IE 311 Industrial Engineering Mathematical Analysis (3)

Application of linear equations, matrices, and determinants to the solution of industrial engineering problems. Mathematical analysis of the effects of changes in system's operating parameters on product/service performance, quality, and cost. 3 lecture-problems. Prerequisite: MAT 214.

IE 312 Engineering Probability and Statistics (3)

Engineering applications of the concepts of probability, statistical distributions, statistical analysis, regression and correlation analysis, analysis of variance and covariance, design of experiments, and probabilistic and statistical models. 3 lecture-problems. Prerequisite: STA 309.

IE 327/337 Elements of Industrial Engineering Systems/Laboratory (3/1)

Concepts and principles of system engineering theory. Introduction to the theory and methodology of engineering systems. Development of analytic techniques to establish needs, objectives, priorities and utilities, and the evaluation of system effectiveness. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: MAT 116, IE 311, IE 312.

IE 331/341 Facilities Planning, Layout and Design/Laboratory (3/1)

Planning and designing facilities, layouts, and material handling systems. Systems engineering approach; quantitative analysis methods; computerized techniques. Projects. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: IE 128, IME 326. IE 312 recommended.

IE 392 Principles of Productivity Engineering (3)

Productivity definitions, concepts, and trends, use of various industrial engineering techniques in productivity improvement, relationship between productivity and profit, phases of a productivity improvement project, case studies. Plant visits and guest speakers. 3 lecture-problems. Prerequisite: upper division standing.

IE 401 Engineering Economic Decision Analysis (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. Open to engineering majors, others as space permits. Prerequisites: Junior standing, course in probability and statistics recommended. 4 lecture-problem solving sessions.

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 lecture-problems. Prerequisite: Junior standing in engineering.

IE 416 Operations Research I (4)

Applications of linear programming and non-linear programming, queuing theory, and other analysis techniques to problems encountered in industry and business. 4 lecture-problems. Prerequisites: IE 311, IE 312.

IE 417 Operations Research II (4)

Development and application of planning and inventory models, networks and graph techniques, Markov analysis, waiting lines, simulation, and sequencing and scheduling algorithms to problems encountered in industry and business. 4 lecture-problems. Prerequisite: IE 416.

IE 419 Reliability Concepts and Techniques (3)

Reliability concepts and techniques as used in various types of industrial organizations. Analysis of the influence of reliability on such factors as complexity, state of the art, and environment. Component reliability related to systems requirements. 3 lecture-problems. Prerequisite: IME 415.

IE 426 Applied Decision Theory (3)

Introduction to decision theory and its applications. Modern utility theory and its application to decision making under risk and uncertainty. Applications of Bayesian decision theory. Emphasis on applications covering a wide range of both profit and nonprofit oriented institutions. 3 lecture-problems. Prerequisite: IE 312 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 lecture-problems, 1 three-hour laboratory. Prerequisites: IE 327, IME 428, IE 312.

IE 436/446 Operations Planning and Control/Laboratory (2/1)

Analysis and design of systems for planning, scheduling and controlling production, inventory and service operations/activities. Use of mathematical and computer models. Projects and open-ended problems. 2 lecture-problems, 1 three-hour laboratory. Prerequisites: IE 327, IE 416, IME 326.

IE 437 Industrial Engineering Systems (3)

Concepts of systems engineering methodology. Methods of technological forecasting and future study. The design and analysis of complex systems under conditions of risk uncertainty and changing environment. 3 lecture-problems. Prerequisite: IE 327.

IME 111/121 Industrial and Manufacturing Engineering Fundamentals/Laboratory (3/1)

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 lecture-problems, 1 three-hour laboratory.

IME 134/144 Molding and Casting/Laboratory (1/1)

Shaping of metals while in the liquid state, common molding and casting techniques for both ferrous and nonferrous materials and alloys. 1 lecture-problem, 1 three-hour laboratory.

IME 228/238 Electronic Process Design/Laboratory (1/1)

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 board production, component preparation and installation, chassis construction, electroforming, and packaging. 1 lecture-problem, 1 three-hour laboratory. Prerequisite: basic electronic and drafting course or consent of instructor.

IME 239 Industrial Costs and Controls (3)

Engineering approach to cost recording, budgetary procedures and controls. Estimating production costs. Engineering problems. Current techniques in automating the cost recording and cost control functions. 3 lecture-problems.

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 326 Production Planning and Control (3)

Principles of production planning and control systems. Methods of forecasting, planning, scheduling, and controlling production operations and inventory activities Quantitative models and computer systems. 3 lecture-problems. Prerequisites: IME 111, IE 312.

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 the quality of manufacturing processes. Process control techniques, acceptance sampling methods, statistical analysis and other techniques used by management to control costs and improve quality. 4 lecture-problems. Prerequisite: IE 312.

IME 428/438 Industrial Computer Systems/Laboratory (3/1)

Provides basic familiarity with digital and analog computers and how computers function and the range of industrial applications for which they are appropriate. Integration, evaluation, and design of computer-centered systems. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: Junior standing, and a computer programming course.

IME 440 Design and Engineering of Automated Systems (3)

Principles of automated systems including automated material handling, assembly, inspection, and warehousing. Factory and office of the future. Fundamentals of computer-integrated manufacturing (CIM), robotics programming and applications, aspects of flexible manufacturing systems, and group technology, economics of automated factory. 3 lecture-problems. Prerequisite: senior standing.

IME 460 Undergraduate Seminar (2)

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments. 2 seminar-discussion. Prerequisite: senior standing.

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: IME 460.

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 and 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 Design Graphics. Emphasis placed upon freehand sketching, working drawings, and descriptive geometry. Geometrical dimensioning according to ANSI 14.5. 2 three-hour laboratories. Prerequisite: MFE 121 or equivalent.

MFE 125 Descriptive Geometry (2)

Study of spatial geometric relationships between lines and planes. Graphical solution of common problems encountered in descriptive engineering expressions. 2 three-hour laboratories. Prerequisite: MFE 121 or equivalent.

MFE 201/211 Manufacturing Systems Processes/Laboratory (3/1)

Study of basic manufacturing processes with emphasis on terminology, technology, process principles and capabilities, material selection and comparative advantages and disadvantages. Processes discussed include material removal, joining, assembly and casting. Other topics include NC, measurement and gaging, and statistical methods. 3 lecture-problems. 1 three-hour laboratory.

MFE 210 Computer-Aided Drafting (2)

Application of the digital computer and plotter to engineering design and graphics. 2 three-hour laboratories. Prerequisite: MFE 121 or equivalent.

MFE 221 Manufacturing Processes—Metal Removal (3)

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, dynamics of metal cutting, tool life analysis, economics of machining, the concept of group technology in cellular and flexible modes. 2 lecture-problems, 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. Computer applications. 1 lecture-problem, 1 three-hour laboratory. Prerequisite: MFE 221 or equivalent.

MFE 230 Manufacturing Processes—Forming and Assembling (3)

Theory of processes and operations employing pressure and temperature to shape metals by utilizing their plastic qualities. Sheet metal and pressworking as used in research, design and manufacture of a marketable product. Emphasis is placed upon analysis and synthesis of the problem-solving process, mechanics ofmetal forming, strain limits and formability, computer-aided design and manufacture of products and dies, and computer-aided process planning of metal structures. 2 lecture-problems, 1 three-hour laboratory.

MFE 246 Graphics for Electronics (2)

Principles and techniques for design and drafting of printed circuit and integrated circuit electronic packaging systems. Design considerations, problems and 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 electronics and drafting courses.

MFE 323 Geometric Dimensioning and Tolerancing (3)

Basics of dimensioning and tolerancing, tolerances of form and position. Government and industry requirements. 2 lecture-problems, 1 three-hour laboratory. Prerequisite: MFE 122 or equivalent.

MFE 324 Production Engineering I (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 and facilities, methods, tool plans, and requirements. 2 lecture-problems, 1 three-hour laboratory. Prerequisite: MFE 121; IME 236 or equivalent.

MFE 325 Production Engineering II (3)

Designing the tools—jigs, fixtures, dies, special purpose tools, and numerical control programs—required to provide economy and quality of manufacturing. Designing tools for automated manufacturing processes, integrated methods, and transfer mechanisms. Design of production accessories, electromechanical tooling devices. Review of tool manufacturing techniques. 2 lecture-problems, 1 three-hour laboratory. Prerequisite: MFE 324 or equivalent.

MFE 350 Principles of Numerical Control (3)

Principles and applications of numerical control in manufacturing, manual and computer-assisted programming, CNC systems including microprocessor applications to production processes, advanced NC systems for full contouring, macro- and variable programming, programmable controllers for CNC and DNC applications in industry. 2 lecture-problems, 1 three-hour laboratory. Prerequisite: MFE 221 or equivalent.

MFE 373, 374 Tool and Die Engineering, I, II (3) (3)

Introduction to tool and die fundamentals. Function, components and appropriate manufacturing techniques are stressed. Die life, maintenance, storage and safety are included. 2 lecture-problems, 1 three-hour laboratory. Prerequisites: MFE 222, MFE 230.

MFE 380 Manufacturing Metrology (2)

The science of engineering measurement as used in inspection and quality control. Emphasis is placed on the general use of scientific measuring devices and how these devices can be used to secure optimal conditions of manufacture. 1 lecture-problem, 1 three-hour laboratory.

MFE 406 Safety Engineering (3)

Principles of safety engineering applied to manufacturing systems. Control of noise, heat, electrical hazards, vibration, radiation, lighting, and air contaminants in the workplace. Accident prevention. Material handling safety, machine guards and personal protection equipment. 3 lecture-problems.

MFE 410 Computer-Aided Design (2)

Introduction to interactive computer graphics systems with emphasis on its application in engineering design. Course taught in an industrial environment. 1 lecture-problem, 1-three hour laboratory. Prerequisites: A course in computer programming, MFE 121, MFE 210.

MFE 411 Manufacturing Processes—Finishing (2)

A comprehensive overview of the possibilities and limitations of finishing processes for both metallic and nonmetallic materials. Consideration of cleaning methods, surface conditioning, and coating processes as related to obtaining high-quality products at reduced manufacturing costs. 1 lecture-problem, 1 three-hour laboratory. Prerequisite: MFE 221 and MFE 230.

MFE 421 Manufacturing Operations Analysis (3)

Analysis of manufacturing operations with emphasis on system optimization, problem solving, feasible systems alternatives and cost considerations. 3 lecture-problems. Prerequisites: IME 239, IME 326, senior standing.

MFE 427 Computer Numerical Control (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 lecture-problems, 1 three-hour laboratory. Prerequisite: MFE 350.

MFE 430 Manufacturing Cost Estimation (3)

A study of cost estimation of modern manufacturing based on processing analysis. The role, function and use of various types of estimates are discussed. 3 lecture-problems. Prerequisite: Senior standing.

MFE 438/448 Plastics Engineering I/Laboratory (2/1)

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. Basic plastic polymers (both thermosetting and thermoplastic resins). 2 lecture-problems, 1 three-hour laboratory.

MFE 439/449 Plastics Engineering II/Laboratory (2/1)

A study of non-metallic plastic processing techniques. Coatings, laminations, machining, compression, transfer, injection, extrusion, vacuum, blow molding and casting processes. An analysis of the major production techniques for thermoset and thermoplastic resin. 2 lecture-problems, 1-three hour laboratory. Prerequisite: MFE 438.

MFE 455/485 Principles of Robotics/Laboratory (2/1)

Components of robots, industrial robots, robot programming, economics of robotics, interfacing robots with process machines, parts feeders, conveyors and inspection devices, robot controllers, microprocessors, applications, case studies, plant visits. 2 lecture-problems. 1 three-hour laboratory. Prerequisite: senior standing.

MFE 465/495 Metal Working Theory and Applications/Laboratory (2/1)

Three-dimensional stress and strain analysis, yield criteria for ductile metals. Stress-strain relations. Phenomenological nature of engineering metals. Plane strain plastic deformation. Plastic strain with axial symmetry and pseudo plane stress. Extremum principles for plastic material. 2 lectures, 1 three-hour laboratory. Prerequisites: MFE 201, MFE 221, MFE 230, ME 219.

MFE 475/480 Computer-Aided Manufacturing/Laboratory (2/1)

Synthesis of computer utilization in manufacturing systems, automation, robotics, CAD/CAM, and computer simulation. 2 lecture-problems, 1 three-hour laboratory. Prerequisite: MFE 350.

MFE 484 Producibility Engineering (3)

Analysis and design of custom equipment to produce specific parts on a systems basis. Industrial problems will be assigned to enhance the concepts involved. 3 lecture-problems. 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

George F. Engelke, *Chair*
Leonard Berkowitz
John R. Biddle
Peter A. Dashner
Vladimir Glozman
James D. Goodin
William C. Hauser
Gary W. Koonce
David L. Miller
Alfred E. Noreen
Carl E. Rathmann
Hassan M. Rejali
Kenneth J. Schneider
John A. Seevers
Michael T. Shelton
William B. Stine
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, energy, control system theory and 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 accredited mechanical engineering curriculum permits students to explore different fields, specializing in one or more of them as they find their true interests. Option programs in petroleum engineering, energy systems engineering and mechanical engineering are available under the degree major.

During the junior and senior years students may choose approved electives in any 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, energy systems, petroleum engineering equipment, environmental control systems, internal and external combustion engines and engineering materials in the various laboratories.

Students desiring to major in Mechanical Engineering should have a particularly high aptitude for science and mathematics, and incoming freshmen should have taken substantial college preparatory courses in these disciplines in high school. Incoming transfer students should have completed at least one year of college calculus and one year of college physics (with laboratory) prior to beginning the program at Cal Poly. The community college student planning to transfer into this department should consult a school counselor or his department to determine which courses meet the program requirements.

Mechanical engineers work in industry, business, government, universities, and in the other professions of law and medicine. They are involved in research, development, design, testing, production, operation, maintenance, marketing, sales, administration, management, and education. Graduates of the program are prepared to do productive work in their first jobs 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.

Mechanical engineering students are encouraged to become active in the student chapters of the American Society of Mechanical Engineers, the Society of Automotive Engineers, The Society of Petroleum Engineers, the American Society of Heating, Refrigeration and Air Conditioning Engineers, and The Association of Energy Engineers. Qualified students are invited to join the student chapter of Pi Tau Sigma, the mechanical engineering honor society.

CORE COURSES FOR MAJOR*

(Required of all students)

Mechanical Engineering Orientation	ME	100	(1)
Engr Digital Computations	ME	132/142	(3)
Vector Statics	ME	214	(3)
Vector Dynamics	ME	215	(4)
Strength of Materials	ME	218	(3)
Strength of Materials	ME	219	(3)
Strength of Materials Laboratory	ME	220	(1)
Engineering Materials	ME	225	(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	(3)
Fluid Mechanics Lab	ME	313	(1)
Stress Analysis	ME	319	(3)
Engr. Num. Computations	ME	330	(4)
Materials Design Lab	ME	350	(1)
Mechanical Vibrations	ME	413	(4)
Heat Transfer	ME	415	(4)
Senior Project	ME	461	(2)
Senior Project	ME	462	(2)
Undergraduate Seminar	ME	463	(2)

* A 2.0 cumulative GPA is required in core courses including option courses for the major-in order to receive a degree in this major.

OPTION COURSES FOR MAJOR*

(Required for Specific Option)

Energy Systems Engineering Option

Energy Management	ME	306	(4)
Alternative Energy Systems	ME	307	(4)
Petroleum Des. Engr.	ME	427	(4)
Electives to be elected from the following list (12 units total)			
Solar Thermal Engineering	ME	407	(4)
Nuclear Engineering	ME	408	(4)
Kinetic Theory/Statistical Thermodynamics	ME	409	(4)
Heat Power	ME	411/431	(4)
Internal Combustion Engines	ME	412/422	(4)
Building Energy Calculations	ME	417/437	(4)
Air Conditioning	ME	418/428	(4)

Mechanical Engineering Option

Machine Design	ME	325/335	(4)
Technical Electives (At least 4 units must be in ME Department)			(20)

Petroleum Engineering Option

Principles of Geology Lab	GSC	141	(1)
Historical Geology Lab	GSC	151	(1)
Petroleum Geology	GSC	351	(4)
Intro to Petroleum Engineering	ME	101	(1)
Petroleum Design Engineering	ME	427/447	(4)
Petroleum Drilling 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)

General Chemistry Lab	CHM	152	(1)
Elements of Elec Engr.	ECE	231/251	(3)
Engineering Econ	IE	401	(4)
Calc of Several Variables	MAT	214	(3)
Calc of Several Variables	MAT	215	(3)
Differential Eqns	MAT	216	(4)
Advanced Engr Design Graphics	MFE	122	(2)
Manufacturing Systems Processes	MFE	201/211	(4)
Computer-Aided Drafting	MFE	210	(2)
General Physics	PHY	131	(3)
General Physics	PHY	133	(3)
General Physics Laboratory	PHY	151	(1)
General Physics Laboratory	PHY	153	(1)

General Education

Category I			
Freshman English I	ENG	104	(4)
Mech Engr Communications	ME	231	(4)
or Writing for the Professions	ENG	301	(4)
or Report Writing	COM	216	(4)
Communications & Aesthetics	SA	290	(4)
Category II			
Anal Geometry & Calculus	MAT	114	(4)
Anal Geometry & Calculus	MAT	115	(4)
Anal Geometry & Calculus	MAT	116	(4)
General Chemistry	CHM	111	(3)
General Chemistry	CHM	112	(3)
General Chemistry Laboratory	CHM	151	(1)
Life Science	BIO	110	(3)
General Physics	PHY	132	(3)
Physics Lab	PHY	152	(1)
Category III			
IIIb Elective			(4)
IIIc Elective			(4)
Category IV			
Principles of Economics	EC	201/202	(4)
Political Sociology	SOC/PLS	290	(4)
Category V			
Category V Elective			(4)
Category VI			
American Civilization	AMC	201	(4)
or Intro to Amer Government	PLS	201	(4)
American Civilization	AMC	202	(4)
or United States History	HST	202	(4)
Category VII			
Adv Engr Measurements	ME	435	(4)
Elec Inst & Control	ECE	333/383	(4)
Machine & Process Control	CH	428/438	(4)

Course Descriptions

All students in engineering and engineering technology curricula must satisfy the specified composition requirements prior to enrolling in any 300-level course in the College of Engineering. Lecture and laboratory courses listed together are to be taken concurrently.

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 (2)

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 lecture-problem, 1 two-hour activity.

ME 132/142 Engineering Digital Computations/Laboratory (2/1)

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 lecture-problems, 1 three-hour laboratory. Corequisite: MAT 114.

ME 214 Vector Statics (3)

Two and three dimensional equilibrium of frames, machine and trusses employing vector algebra. Principles of friction, centroids and center of gravity, moments of inertia for areas and masses. 3 lecture-problems. 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 lecture-problems. Prerequisite: C—or better in ME 214. Corequisite: MAT 214.

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 lecture-problems. Prerequisites: MAT 116 and C- or better in ME 214.

ME 219 Strength of Materials (3)

Deflection and slope of beams by double integration, singularity functions, superposition and energy methods. Statically indeterminate beams. Column analysis with centric and eccentric loads. Combined axial, torsional, and flexural stresses. Theories of failure (ductile and brittle). Thick-walled pressure vessels. 3 lecture-problems. Prerequisite: C— or better in ME 218.

ME 220 Strength of Materials Laboratory (1)

Standard physical tests of engineering materials including torsion, tension, compression and bending. Experimental stress analysis using strain gages. 1 three-hour laboratory. Corequisite: ME 219. Prerequisites: C— or better in ME 231, ENG 301, or COM 219. A score of 6 or better on GWT.

ME 225 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, elastomers, and composites. Principles of corrosion protection. 3 lecture-problems. Prerequisite: CHM 112 and ME 220 concurrent.

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 lecture-problems. Prerequisite: C— or better in ME 100. Corequisite: 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 lecture-problems, 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)

Thermodynamic 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 lecture-problems. Prerequisites: PHY 132, C— or better in ME 214.

ME 302 Thermodynamics (4)

Rankine cycle and its variations; refrigeration cycles; advanced Brayton cycle and Otto and Diesel cycles; mixtures of ideal gases; Maxwell relations; thermodynamic properties for real gases. 4 lecture-problems. Prerequisite: C—or better in ME 301. Corequisite: MAT 215

ME 303 Cooling Electrical/Electronic Components (4)

Fundamental principles of heat transfer by conduction, convection and radiation. Application to design and analysis of temperature-sensitive electrical/electronic components requiring energy dissipation for proper operation. Open only to majors in Electrical and Computer Engineering. 4 lecture-problems. Prerequisite: C— or better in ME 214.

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 lecture-problems. Prerequisite: C— or better in ME 301 or equivalent.

ME 307 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. 4 lecture-problems. Prerequisites: C– or better in 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 lecture-problems. Prerequisites: PHY 132 and MAT 214. C– or better ME 215.

ME 312 Fluid Mechanics (3)

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 lecture-problems, Prerequisite: C– or better in ME 301 and 311.

ME 313 Fluid Mechanics Laboratory (1)

Measurement of viscosity, centrifugal pump performance, pressure drop in a pipe, air velocity distribution from a fan discharge. Calibration and use of laboratory equipment; acquisition, processing, and analysis of data by manual and automated methods; report writing. 1 three-hour laboratory. Prerequisites: A score of 6 or better on the GWT, C– or better in ME 311 and ME 231, or equivalent. Corequisite: ME 312.

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 lecture-problems. Prerequisite: C– or better in ME 215.

ME 319 Stress Analysis (3)

Stress concentration. Repeated loading involving fatigue and endurance strength. Shaft design. Introduction to fracture mechanics. Design of screws, fasteners, and connections. Shrink fit. Special topics. 3 lecture-problems. Prerequisites: ME 219 and ME 220 with C– or better.

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. 3 lecture-problems. Prerequisite: Junior Standing.

ME 325/335 Machine Design/Laboratory (3/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisites: MFE 221, MFE 222 or 230. C– or better in ME 215,233 and 319.

ME 326/336 Machine Design/Laboratory (2/2)

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 lecture-problems, 2 three-hour laboratories. Prerequisite: C– or better in ME 325.

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. 4 lecture-problems. Prerequisites: MAT 216, and C– or better in 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 lecture-problems. Prerequisite: MAT 216, C– or better in ME 215, 301, 311

ME 350 Materials Design Laboratory (1)

Laboratory tests of cold working, annealing, heat treatment, galvanic corrosion, and mechanical properties of polymers. Material selection for prescribed applications. 1 three-hour laboratory. Prerequisite: C– or better in ME 225 and ME 231, 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 Drilling Engineering (4)

Drilling programs and concepts; optimizing penetration rates; rheology of drilling muds and lifting capacity; system pressure losses and optimization of hydraulics; well completions and casing design. 4 lecture-problems. Prerequisites: C— or better in ME 219 and ME 312, or equivalent.

ME 402 Petroleum Reservoir Engineering (4)

Reservoir performance methods associated with decline curve analysis, material balance, steady state and unsteady state flow, diffusivity equation and pseudo-steady state fluid flow. Radial reservoirs: Ei solution, constant terminal pressure solution. Pressure distributions in multiple wells, superposition, and well testing. 4 lecture-problems. Prerequisite: C— or better in ME 312.

ME 403 Petroleum Production Engineering (4)

Oil-gas separation systems and facilities, oil field water systems, artificial lift, water quality analysis, water flood and injector performance, well stimulation, cementing and well economics. 4 lecture-problems. Prerequisites: C— or better in ME 219 and ME 312.

ME 404 Piping Stress and Design (4)

Pressure piping codes, petroleum refinery piping and support design; pipe stress analysis under thermal friction, wind and seismic loads; equipment loads of pumps, turbines, compressors, heat exchangers; flexible connectors; vibration of reciprocating machinery. 4 lecture-problems. Prerequisites: C— or better in ME 319.

ME 405 Acoustics and Noise Control (4)

Fundamental acoustic parameters (dB, dBA, PSIL, octave band). Physiological response to noise. Noise standards. Sound pressure-power relation. Noise measurement, with individual experience using a Precision Integrating Noise Meter. Noise supression by absorption, isolation and resonators. Case studies in noise control and reduction. 4 lecture-problems. Prerequisite: C— or better in ME 301, or ME 311, or consent of instructor.

ME 406 Finite Element Analysis (4)

Stiffness and influence coefficients. Shape functions. Element stiffness. Coordinate transformations. Assemble stiffness matrix. Solution to give deflections and forces, or analogous parameters for heat transfer and fluid flows. Apply a widely-used finite element computer program (NASTRAN) to structure design, heat transfer and/or fluid flow. 4 lecture-problems. Prerequisite: C— or better in ME 330 and ME 319, or consent of instructor.

ME 407 Solar Thermal Engineering (4)

Solar radiation distribution and measurement; methods of solar energy collection; thermal analysis of flat plate solar collectors; experimental testing and efficiency determination; solar energy storage; solar economics; transient and long-term system performance; computer modelling for solar space and water heating applications. 4 lecture-problems. Prerequisites: C— or better in ME 312 and ME 415, or equivalents.

ME 408 Nuclear Engineering (4)

Nuclear power plant systems and engineered safety features. Reactor types, design and control. Nuclear, neutron and reactor physics. Radioactivity fission, moderation, and criticality. 4 lecture-problems. Prerequisites: MAT 216, PHY 133, C— or better in ME 301.

ME 409 Kinetic Theory/Statistical Thermodynamics (4)

Review of classical thermodynamics; kinetic theory of an ideal gas; distribution of molecular velocities; transport phenomena; quantum mechanics; Bose-Einstein quantum statistics; Maxwell-Boltzmann statistics; partition functions; advanced kinetic theory. 4 lecture-problems. Prerequisite: C— or better in ME 302 and ME 312, or equivalents.

ME 411/431 Heat Power/Laboratory (3/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisites: C— or better in ME 302 and ME 312.

ME 412/422 Internal Combustion Engines/Laboratory (3/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisites: C— or better in ME 302, ME 415, 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 lecture-problems. Prerequisites: MAT 216, C— or better in ME 215, and ME 330 or equivalent.

ME 414 Advanced Vibrations (3)

Vibration of multi-degree of freedom systems. Matrix iteration, normal coordinates, forced vibration, transfer matrices, continuous systems. 3 lecture-problems. Prerequisite: C— or better in ME 413.

ME 415 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 lecture-problems. Prerequisites: MAT 216, C— or better in ME 312.

ME 417/437 Building Energy Calculations/Laboratory (3/1)

Psychrometrics; thermal environmental requirements for human habitation; calculation of building heating and cooling loads; predicting building energy use. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: C— or better in ME 302 and 311.

ME 418/428 Air Conditioning/Laboratory (3/1)

Review of psychrometrics; room air distribution; building air distribution systems; principles of refrigeration; refrigeration equipment; combustion; heating equipment; air conditioning system types. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: C— or better in ME 302 and ME 311.

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 lecture-problems and 1 three-hour laboratory. Prerequisite: C— or better in ME 316.

ME 427/447 Petroleum Engineering Design/Laboratory (3/1)

Selection of heat exchangers, compressors, pumps, steam generators, and accessories to meet performance requirements encountered in petroleum industry. Design of a thermal-fluid mechanical system to meet a petroleum engineering requirement. Preliminary design and preparation of specifications for procurement of thermal-fluid-mechanical equipment to meet performance requirements. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: C— or better in ME 415.

ME 435/445 Advanced Engineering Measurements (3/1)

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. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: ECE 333 and C– or better in ME 413. A score of 6 or better on the GWT.

ME 438/448 Human Engineering in Design/Laboratory (2/1)

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 lecture-problems, 1 three-hour laboratory. Prerequisite: Junior standing in engineering.

ME 439/449 Design of Machine Controls/Laboratory (2/2)

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 lecture-problems, 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: C— or better in ME 463.

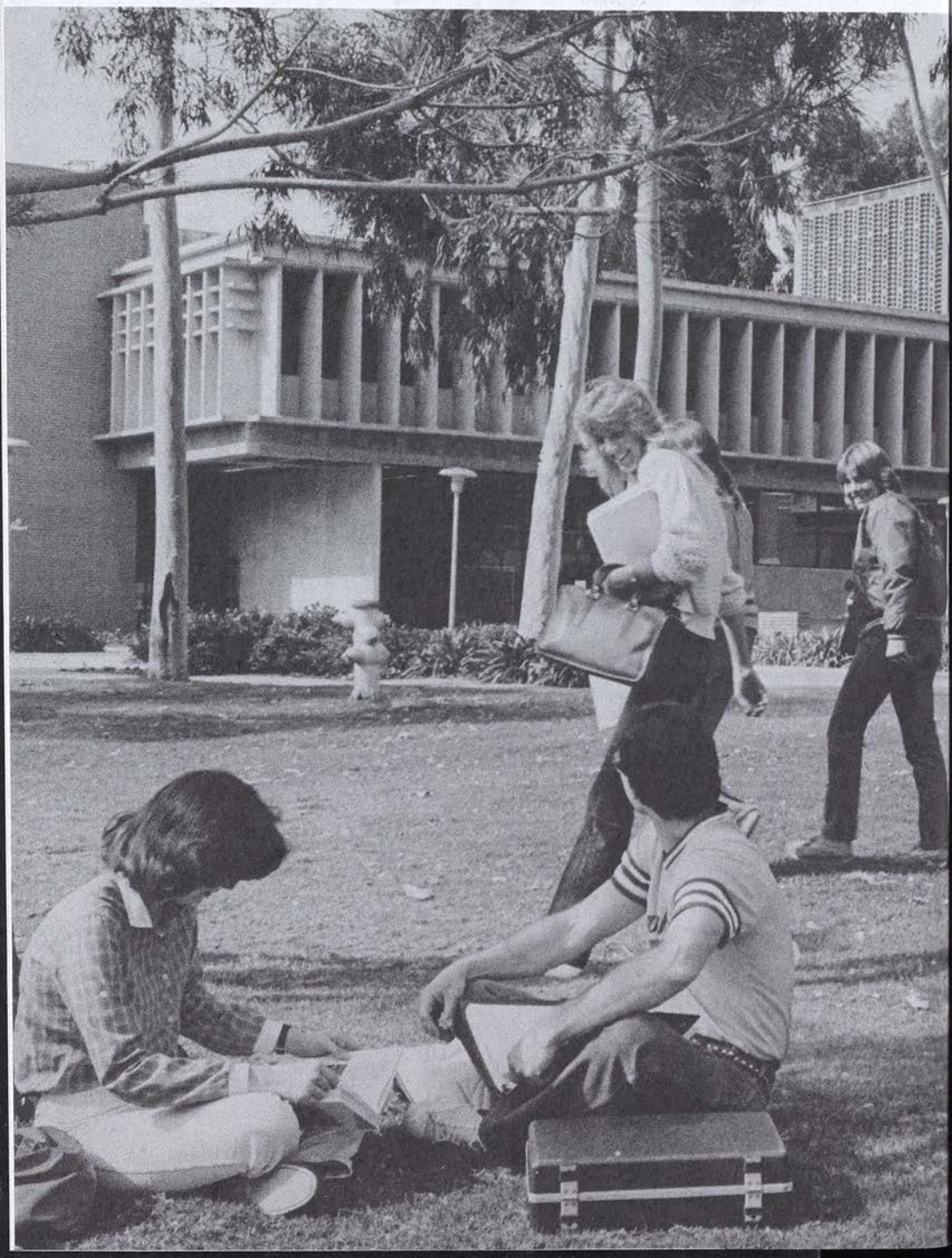
ME 463 Undergraduate Seminar (2)

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 lecture seminar-discussions. Prerequisites: C— or better in ME 231 or equivalent, must have satisfied the GWT requirement.

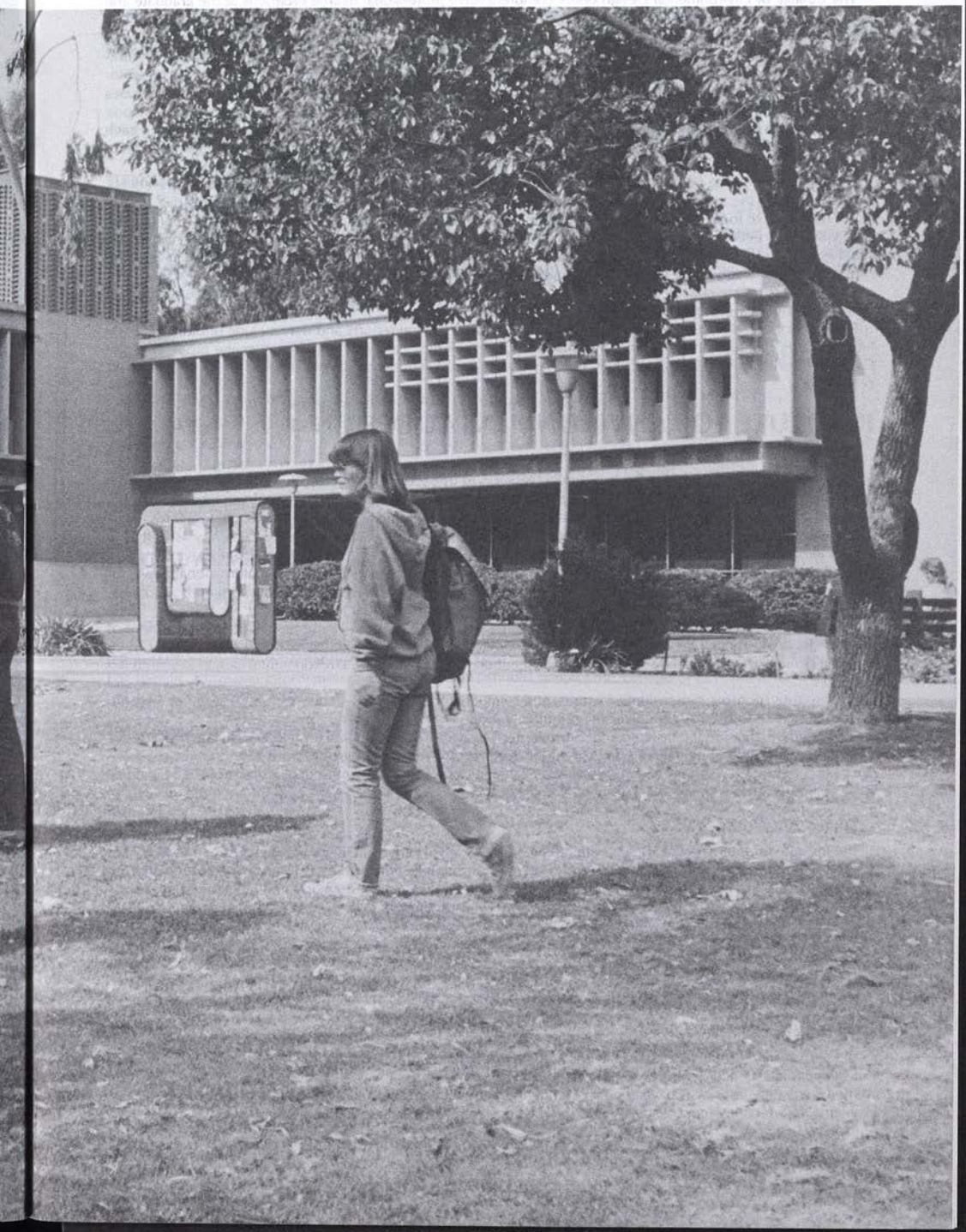
ME 499 Special Topics for Upper Division Students (1–4)

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.

COLLEGE OF
ENVIRONMENTAL DESIGN



COLLEGE OF ENVIRONMENTAL DESIGN



COLLEGE OF ENVIRONMENTAL DESIGN

Marvin J. Malecha, *Dean*

Patricia B. Oliver, *Associate Dean*

The College 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 College of Environmental 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 college and the university.

The programs offered within the college are fully accredited by the respective review organizations within each discipline. The College of Environmental Design is unique in that accredited programs are offered within three of the four departments at both the undergraduate and graduate level of instruction.

From its inception the College 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 college in its responsibilities to the student and to the professional world. The college has been organized to provide both formal and informal contacts between the departments. Shared services between the departments include student counseling, research facilities, instructional support facilities and shop equipment. Students are encouraged to participate in student organizations which combine individuals from each department. As a college dedicated to a collaborative effort the faculty, staff and students view themselves as an Environmental Design community.

Student work is submitted in the form of drawings, models, written reports and may include photographic exhibits utilizing slides, prints and video presentations for review by faculty. All work becomes the property of the College of Environmental Design archives and may be retained or returned at the discretion of the college archives committee.

INSTITUTE FOR ENVIRONMENTAL DESIGN

Denise Lawrence, *Director*

The purpose of the Institute for Environmental Design is to provide a focus for the encouragement and support of research, the improvement of education, the provision of community and professional services and the enrichment of minds and lives within the College of Environmental Design at Cal Poly. The broader concerns of the Institute are the identification and resolution of environmental design issues of importance to society as well as to the planning and design professions. The Institute is currently active in the areas of Architecture, Behavior and Design, Computers, Design Education Progress, Energy, Environmental Education, Housing, International Development, Landscape Design, Professional Practice, Resource Management/Conservation, Transportation, School Facility Design, Urban Design/Community Development, and Urban/Regional Planning.

Recent clients have included San Bernardino County, Los Angeles County, State of California Department of General Services, Capital Area Development Authority, University of California Natural Reserve System, City of Pomona, Southern California Edison, Northrop Corporation, Apple Computer, Environmental Design Research Association.

The Institute sponsors symposiums, lectures, and seminars for faculty and students of the College of Environmental Design and of the larger university community.

Further information on the Institute and its programs is available from the Director, Dr. Denise Lawrence (714) 869-2674; or the Office of the Dean, College of Environmental Design, Building 7, Room 229.

THE INSTITUTE FOR INTERNATIONAL STUDIES

Spyros Amourgis, *Director*

The Institute for International Studies within the College of Environmental Design has been formed to foster academic opportunities abroad for students and faculty. The Institute's primary role is to coordinate the certificate programs in Urban Planning, Preservation Studies, International Planning and Environmental Design. These programs are offered at present in Italy and Greece during spring and summer quarters. Non-credit and non-certificate summer study tours for students and alumni will also be coordinated by the Institute.

Further information is available from the Director, Professor Spyros Amourgis, Building 7, Room 103A, (714) 869-2691.

LIFE QUALITY INSTITUTE

Barry L. Wasserman, *Director*

The Life Quality Institute is a University Institute housed within the Department of Environmental Studies. Each College appoints a Faculty Fellow and the College Deans serve as an advisory board.

The Life Quality Institute is based upon a commitment to an interdisciplinary approach to the understanding of problems before contemporary society and the relationship of society to the environment.

The activities of the Institute are expected to encourage efforts in education that inform, support and improve the teaching and learning roles of individuals as they relate to a holistic understanding of the environment and the relationships of the environment to our quality of life. The Institute's broader education orientation is served through the sponsorship of symposia, publications, visitors to campus, project research work and related efforts that seek to inform the public and the University community of environmental issues and societal needs.

CENTER FOR ENVIRONMENTAL DESIGN EDUCATION

Doreen Nelson, *Director*

The Center for Environmental Design Education is an Interdisciplinary Center devoted to the premise that environmental design should be utilized as both a subject and a process in the preparation of students for teaching, and in the acquisition of learning by students of all ages. Design and three-dimensional learning are seen as a necessary part of everyone's general education experience and the Institute is involved in teaching courses and developing programs within the University to make this a reality.

COMPUTER AIDED INSTRUCTION LABORATORY (CAI LAB)

Herschel H. Farberow, *Director*

The Computer Aided Instruction Laboratory, in the Environmental Design Building, provides a range of work stations for ENV students to explore the use of computers. Classroom computer instruction is supported by the lab for a variety of design and planning applications. Applications research and continuing education for the professional community is also carried out by the lab.

Further information is available from the Director, Herschel H. Farberow, Building 7, Room 213A, (714) 869-2668.

Departments and Majors

ARCHITECTURE
Barry L. Wasserman, *Chair* Architecture (BArc) Master of Architecture.

ENVIRONMENTAL STUDIES
Denise L. Lawrence, *Chair*

LANDSCAPE ARCHITECTURE
John T. Lyle, *Chair* Landscape Architecture (BS) Master of Landscape Architecture

URBAN AND REGIONAL PLANNING
Charles M. Hotchkiss, *Chair* Urban and Regional Planning (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 additional standards required by the Department of Architecture. For specific admission information, interested students should contact the College of Environmental Design Admissions and Records Office.

Interdisciplinary General Education (IGE)

Students majoring in the various programs in ENVIRONMENTAL DESIGN are encouraged to take part of their General Education requirements through the Interdisciplinary General Education Program (IGE). This IGE program is specially designed to meet the needs of ENV students particularly in the areas of writing, critical thinking, humanities and the social sciences.

COOPERATIVE EDUCATION

The College 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 College of Environmental Design. The student's job performance is evaluated by both the work supervisor and a College 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 College 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. Prerequisite: Architecture students must have fulfilled the 1000 hours office experience.

Environmental Design Courses

(For Non-Major Students:)

ENV 111 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)

Introduction to the art of architecture as a creative and concrete expression of individual and cultural values. An examination of the role of creativity in designing and experiencing buildings, and in achieving a balance between the man-made and natural environments. Explorations in the meaning of architecture through an overview of aesthetic and pragmatic design issues. 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 personally contribute to the improvement of the American urban environment. Two 2-hour lectures. Not open to URP majors.

ENV 200 Special Problems for Lower Division Students (2)

Individual or group investigations, research, or studies. May be repeated for credit.

ENV 400 Special Problems for Upper Division Students (2–4)

Individual or group investigations, research, or studies. May be repeated for credit.

ARCHITECTURE

Barry L. Wasserman, *Chair*
William Adams
Spyros Amourgis
Brooks Cavin, III
Richard J. Chylinski
Craig Ellwood
Hsin-Ming Fung
Arthur E. Hacker
Paul Helmle
Maurice Herman
Neil Jackson
Frederick Koeper
Norberto Nardi
Patricia B. Oliver
Sigrid Miller-Pollin
Edward E. Pickard
Professor Emeritus
Dariouche Showghi
Patrick Sullivan
Bernard Zimmerman

The departments of Architecture, Environmental Studies, Landscape Architecture and Urban and Regional Planning form the College of Environmental Design.

Coursework within the Department of Architecture is open only to those students who have been admitted to the Department and are designated Architecture Majors.

The degree, Bachelor of Architecture, is offered in a five-year curriculum which focuses on the design laboratory. 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 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 with superior work retained for display and archival use.)

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.

The Department of Architecture is a member of the Association of Collegiate Schools of Architecture. Courses are taught by a faculty 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 over subscribed, 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	(6)
Architectural Design	ARC	202	(6)
Architectural Design	ARC	203	(6)
Architectural Design	ARC	301	(6)
Architectural Design	ARC	302	(6)
Architectural Design	ARC	303	(6)
Structures	ARC	321	(4)
Structures	ARC	322	(4)
Structures	ARC	323	(4)
Environmental Controls	ARC	331	(4)
Environmental Controls	ARC	332	(4)
Building Construction	ARC	341	(4)
Building Construction	ARC	342	(4)
Ancient and Medieval Architecture	ARC	361	(4)
Renaissance and Baroque Architecture	ARC	362	(4)
European Architecture (1750–1950)	ARC	363	(4)
Architectural Design	ARC	401	(6)
Architectural Design	ARC	402	(6)
Architectural Design	ARC	403	(6)
Architectural Design	ARC	405	(6)
Architectural Design	ARC	406	(6)
Seismic Design in Arch	ARC	424	(4)
American Arch	ARC	464	(4)
Architectural Practice	ARC	471	(4)
Architecture and Computers	ARC	474	(4)
Thesis/Project Research Data Collection	ARC	491	(2)
Thesis/Project Programming	ARC	494	(2)
Bachelor's Degree Project	ARC	495	(8)
Living with the Land	ENV	111	(4)
Cities, Citizens and Urban Planning	ENV	113	(4)
Total Core Courses			154

PROFESSIONAL ELECTIVES

Select 16 units from below:

Energy Conservation	ARC	333	(4)
Solar Applications	ARC	334	(4)
Advanced Structures	ARC	425	(4)
Advanced Structures	ARC	426	(4)
Contemporary Architecture	ARC	465	(4)
Japanese Architecture	ARC	466	(4)
California Architecture	ARC	467	(4)
The Architect and the Development Process	ARC	473	(4)
Computer Aided Design in Architecture	ARC	475	(4)
Business Development in Architecture	ARC	476	(4)
Behavioral Factors in Architecture	ARC	481	(4)
Behavioral Factors in Architecture	ARC	482	(4)
Behavioral Factors in Architecture	ARC	483	(4)
Approved Engineering Elective			(4)
Total Professional Electives			(16)

GENERAL ELECTIVES

Free Electives (8)

*A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

INTERDISCIPLINARY GENERAL EDUCATION

The Department of Architecture prefers that students starting in the program as freshmen take the Interdisciplinary General Education (IGE) program coursework to meet their general education degree requirements. Coursework would be as follows:

IGE PROGRAM

Consciousness and Community	CPU	120	(4)
Rationalism and Revelation	CPU	121	(4)
Authority and Faith	CPU	122	(4)
Culture and Contact	CPU	220	(4)
Reform and Revolution	CPU	221	(4)
Individualism and Collectivism	CPU	222	(4)
Promise and Crisis	CPU	223	(4)
Connections Seminar	CPU	224	(4)

ADDITIONAL GENERAL EDUCATION REQUIREMENTS

Category I: (pattern 2)

B. Advocacy and Argument	COM	204	(4)
C. Freshman English II	ENG	105	(4)

Category II: (pattern 1)

A. Trigonometry	MAT	106	(4)
B. College Physics	PHY	121	(3)
College Physics Lab	PHY	141	(1)
C. Basic Biology	BIO	115	(5)
D. Environmental Geology	GSC	250	(4)
or Environmental Conservation	BIO	201	

Category III

A. Any listed art, drama or music course .....(4)

Category IV

A. Principles of Economics	EC	201	(4)
or Principles of Economics	EC	202	

Category VIII

See Departmental Advisor.....(12)

Total IGE/GE Courses.....(76)

GENERAL EDUCATION REQUIREMENTS

Category I: (pattern 2)

A. Freshman English I	ENG	104	(4)
B. Advocacy and Argument	COM	204	(4)
C. Freshman English II	ENG	105	(4)

Category II: (pattern 1)

A. Trigonometry	MAT	106	(4)
B. College Physics	PHY	121	(3)
College Physics Lab	PHY	141	(1)
C. Basic Biol.	BIO	115	(5)
D. Environmental Geology	GSC	250	(4)
or Environmental Conservation	B10	201	(3)

Category III

A. Any listed art, drama or music course .....(4)
B. Any listed history or philosophy course .....(4)
C. Any listed English literature course .....(4)

Category IV

A. Principles of Economics	EC	202	(4)
or Principles of Econ	EC	201	(4)
B. Principles of Sociology	SOC	201	(4)
or Introduction to Cultural Anthropology	ANT	102	(4)

or any listed EWS course

C. Any listed course except PLS 290 .....(4)

Category V

Select one course .....(4)

Category VI

Select one course from each area.....(8)

Category VIII

See Departmental Advisor .....(12)

Total General Education Courses.....(76)

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)

An introduction to the design process through a variety of projects and field trips. This course is open only to students accepted into the Department of Architecture through the University admissions process. Lecture: 1 hour; 3 three-hour laboratories.

ARC 102 Introduction to Environmental Design (4)

The relationship between the design process and the physical environment, examined through a series of basic design exercises emphasizing concept, form and the development of graphic skills. Prerequisite: ARC 101. Lecture: 1 hour; 3 three-hour laboratories.

ARC 103 Introduction to Architectural Design (4)

The design process in architecture explored through a series of projects. Awareness of basic design and environmental considerations are emphasized. Prerequisite: ARC 102. Lecture: 1 hour; 3 three-hour laboratories.

ARC 200 Special Problems for Lower Division Students (1–2)

Individual or group investigation, research, studies or survey of selected problems. Problems to be student initiated under faculty guidance. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ARC 201 Architectural Design (6)

A review of basic visual design. Introduction to architectural drawing as a means of communication. Fundamentals of architectural design. Prerequisite: ARC 103. 3 lectures, 3 three-hour laboratories.

ARC 202 Architectural Design (6)

Explorations in architectural design focusing on the basic elements and patterns of buildings and of site context. Design of simple buildings. Prerequisite: ARC 201. 3 lectures, 3 three-hour laboratories.

ARC 203 Architectural Design (6)

Continuing explorations of architectural design concentrating on notions of dwelling environment. Fundamentals of design for solar and structural efficiency and expression. (C grade or better required for advancement to ARC 301.) Prerequisite: ARC 202. 3 lectures, 3 three-hour laboratories.

ARC 299 Special Topics for Lower Division Students (1–4)

Study of a selected topic, the subject matter and title to be initiated by the faculty in advance. Instruction is by lecture, laboratory, or a combination of both. Prerequisite: Permission of instructor.

ARC 301 Architectural Design (6)

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 including methods of building, materials, environmental controls and building technology. Prerequisite: ARC 203 with a C grade or better, ARC 341, ARC 363, MAT 106. 3 lectures, 3 three-hour laboratories.

ARC 302 Architectural Design (6)

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. 3 lectures, 3 three-hour laboratories.

ARC 303 Architectural Design (6)

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. 3 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 106, PHY 121, 141. 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 introducing 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: 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 334 Solar Design Applications in Architecture (4)

Advanced study of building with respect to solar design. The study of passive and active solar design, building orientation, materials and site planning. A review of historical applications of solar design. The study of solar design as an alternate energy source. 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 103. 2 two-hour lectures.

ARC 342 Building Construction (4)

Purpose and preparation of working drawings and specifications. Prerequisite: ARC 341. 2 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)

The theory and design of architecture and city planning from 1400 to 1750 with an emphasis on Italy, France, and England. Prerequisite: ARC 361. 2 two-hour lectures.

ARC 363 European Architecture 1750–1950 (4)

A survey of European 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. Problems to be initiated by student with guidance from faculty. Total credit limited to 4 units with a maximum of 2 units per quarter. Prerequisite: ARC 303.

ARC 401 Topics in Advanced Architectural Design (6)

Topics in Advanced Architectural Design. See Department Office for list of topics offered. Lecture: 3 hours; Laboratory: 9 hours. Prerequisites: ARC 303, ARC 323, ARC 332, ARC 342.

ARC 402 Architectural Design (6)

Topics in Advanced Architectural Design. See Department Office for list of topics offered. Lecture: 3 hours; Laboratory: 9 hours. Prerequisite: ARC 401.

ARC 403 Architectural Design (6)

Concentration on one building project type concerning a diversity of design and technological issues. Prerequisite: ARC 402. Lecture: 3 hours; Laboratory: 9 hours.

ARC 405 Architectural Design (6)

Topics in Advanced Architectural Design. See Department Office for list of topics offered. Lecture: 3 hours; Laboratory: 9 hours. Prerequisite: ARC 403.

ARC 406 Architectural Design (6)

Topics in Advanced Architectural Design. See Department Office for list of topics offered. Lecture: 3 hours; Laboratory: 9 hours. Prerequisite: ARC 405.

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. 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 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. Prerequisite: Upper division status in declared major. Not open to architecture majors.

ARC 464 American Architecture (4)

English, Spanish, and French Colonial American Architecture of the new republic. Nineteenth-century eclecticism and technical innovation. The formulation of a modern architectural theory. Prerequisites: ARC 362. 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 466 Japanese Architecture (4)

A survey of Japanese architecture from feudal times to the present with emphasis on the traditional house and the innovative architecture of the post-war period. Prerequisite: ARC 363 or ARC 464. 2 two-hour lectures.

ARC 467 California Architecture: The Look of the Place (4)

California examined from the vantage of its architectural elements, its houses, workplaces, civic spaces, and roads, and their history. The influences, events, values, technologies, and processes which interact in the making of architecture and which result in human patterns upon the landscape of California will be surveyed. Field trips. Open to non-majors. Two 2-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. Prerequisite: ARC 203 or equivalent. 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 Introduction to Computer-Aided Design in Architecture (4)

A laboratory exploration of the principles governing the use of computers in the architectural design process. This introductory CAD course is designed to give students a working knowledge of the AutoCAD system. Prerequisites: ARC 303, ARC 332, 2 two-hour lectures.

ARC 475 Advanced Computer-Aided Design in Architecture (4)

Advanced study in the use of computers in the architectural design process emphasizing enhanced visualization skills through the use of electronic media. Prerequisite: ARC 474. 2 two-hour lectures.

ARC 476 Business Development in Architecture (4)

The study of the relationship between the architect, employee, client, and contractor; including a study of new business development strategies, winning a commission, marketing, and client communications. Prerequisites: ARC 471. 2 two-hour lectures.

ARC 481 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: ARC 203 or equivalent. Lecture: 4 hours.

ARC 482 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 481. Lecture: 4 hours.

ARC 483 Behavioral Factors in Architecture (4)

A course designed to study in a seminar format case studies of the application of behavioral factors in the design process. Prerequisite: ARC 482. Lecture: 4 hours.

ARC 491 Thesis/Project Research Data Collection (2)

Identification, development of bibliography and initial research for Bachelor degree project. Seminar: 2 hours. Prerequisite: Admission to ARC 405.

ARC 494 Thesis/Project Programming (2–2)

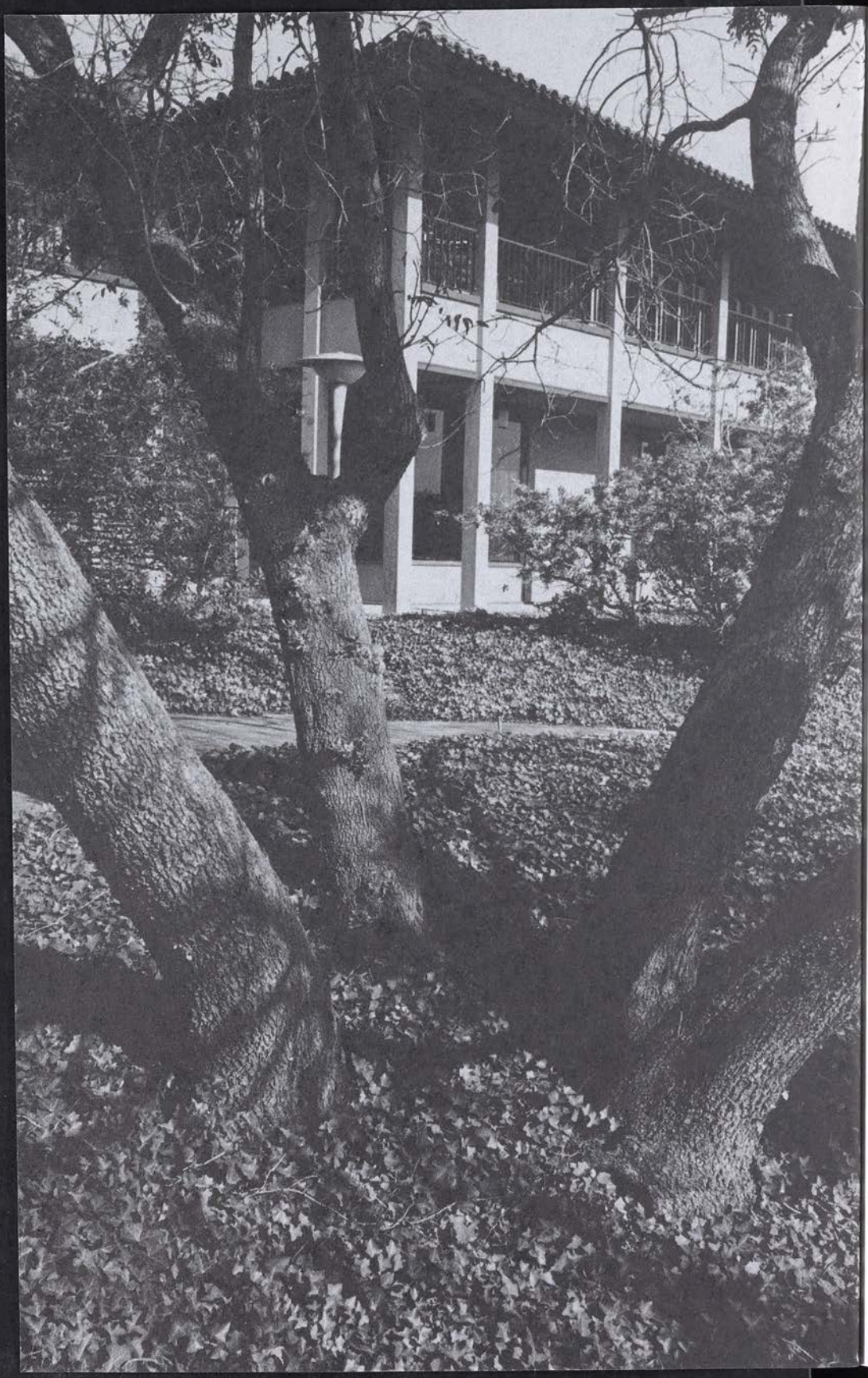
Continuation of ARC 491. Research and programming of the Bachelor degree project. Seminar: 2 hours. Prerequisite: ARC 491.

ARC 495 Bachelor's Degree Project (8)

Comprehensive architectural design project illustrating the individual student's proficiency in the design process. The independent design projects are meant to reveal an understanding of programming, human behavior, context, conceptual design, integration of structural and environmental systems, design development, and verbal and visual presentation. Prerequisites: ARC 406, ARC 491, ARC 494 and approval of project program by faculty committee.

ARC 499 Special Topics for Upper Division Students (1–4)

Study of a selected topic, the subject matter and title to be initiated by the faculty in advance. Instruction is by lecture, laboratory, or a combination of both. Prerequisite: Permission of instructor and ARC 303.



ENVIRONMENTAL STUDIES

Denise Lawrence, *Chair*

Doreen Nelson

The Department of Environmental Studies is a new service department dedicated to the promotion of understanding between the departments of the College and the awareness of environmental concerns among students of the entire University. Its faculty are involved in interdisciplinary programs throughout the College and the University. The department is the home of three special institutes. The Life Quality Institute is a University institute devoted to the interdisciplinary study of the quality of life and of the relationship between environmental issues and societal needs. The Center for Environmental Design Education is devoted to the premise that environmental design should be utilized as both a subject and a process in preparing teachers. The Institute for Environmental Design is the major home of the College's research efforts.

Course Descriptions

ES 112 Design and the Built Environment (4)

Introduction to the tools, techniques, and processes that design professionals use to create our physical world. Experiences with the built environment provides ways to join abstract ideas with practical and creative solutions for living. 4 lecture-problem solving. Recommended for Liberal Studies and General Education students.

ES 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.

ES 299 Special Topics for Lower Division Students (1–4)

Study of a selected topic, the title to be initiated by the faculty in advance. Instruction is by lecture, laboratory, or a combination of both. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

ES 380 Design Studio Research (2–4)

Environment-behavior research coordinated with specific environmental design studio courses. Introduction to and experience with archival and field research methods, data collection and analysis techniques, interpretation for design problems, and report preparation. Concurrent enrollment in specified environmental design studio required. 2 or 4 lecture-discussion.

ES 400 Special Problems for Upper Division Students (1–2)

Individual or group investigation, research, studies, or surveys of selected problems. Problems to be initiated by student with guidance from faculty. Total credit limited to 4 units with a maximum of 2 units per quarter.

ES 420 The Designer as Teacher (4)

A course preparing architecture and planning students for communicating issues of design of the built environment to clients, community groups, and students. 4 lecture-discussion.

ES 499 Special Topics for Upper Division Students (1–4)

Study of a selected topic, the subject matter and title to be initiated by the faculty in advance. Instruction is by lecture, laboratory, or a combination of both. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: permission of instructor.

LANDSCAPE ARCHITECTURE

_____, *Chair*

Stephen F. Bochkor	Kenneth S. Nakaba	D. Rodney Tapp
Timothy R. Day	Jeffrey K. Olson	Takeo Uesugi
J. Anne Holman	Robert C. Perry, Jr.	Chester A. Volski
John T. Lyle	Joan Safford	Mark J. von Wodtke

Landscape architects are professionally concerned with the design management, preservation, and use of the land. The curriculum in Landscape Architecture provides a foundation in all of these areas with particular emphasis on design, along with the cultural and technical subjects that support it. Coursework includes study of the elements and principles of art, design and planning processes, graphic communication, plants and planting design, construction methods and environmental history. Instruction fosters the development of creative and problem-solving abilities, communication skills, technical knowledge, environmental awareness and professional attitudes. In most courses, students develop design proposals or technical solutions for actual sites with instruction, guidance, and criticism from faculty members. In the final year of study, students may choose to emphasize urban or regional landscape issues.

The Bachelor of Science in Landscape Architecture is a professional degree, nationally accredited by the Landscape Architectural Accreditation Board and approved by the California Board of Landscape Architects. Holders of this degree find career opportunities in private practice; with municipal, county and state departments of planning and of parks and recreation; with corporate organizations; and with federal agencies such as the United States National Forest Service and Park Service. The student organization is affiliated with the American Society of Landscape Architects.

The curriculum requires a minimum of four years. Students may enter the program directly from high school or as transfers from other institutions. In order to enter the four year design sequence at the second year level or higher, a portfolio review is required.

Students who maintain a grade point average of 3.2 or higher are eligible for membership in Sigma Lambda Alpha, a national honorary society for students of landscape architecture.

CORE COURSES FOR MAJOR *

(Required of all students)

Intro to Env Design	LA	101	(3)
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	(3)
Graphic Communication	LA	231	(3)
Landscape Graphics	LA	232	(3)
Plant Materials and Design	LA	241	(3)
Plant Materials and Design	LA	242	(3)
Plant Materials and Design	LA	243	(3)
Inter Landscape Des	LA	301	(5)
Inter Landscape Des	LA	302	(5)
Inter Landscape Des	LA	303	(5)
Landscape Constr	LA	331	(4)
Landscape Constr	LA	332	(4)
Landscape Constr	LA	333	(5)
Plant Design	LA	341	(4)
Adv Landscape Des	LA	401	(5)
Adv Landscape Des	LA	402	(5)
Adv Landscape Des	LA	403	(5)
# Regional Landscape History	LA	322	(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)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Select two of the three courses.

SUPPORT & GENERAL EDUCATION COURSES

(Required of all Students)

Landscape Constr	AE	124	(3)
General Surveying	AE	232	(3)
Intro to Drawing	ART	140	(3)
LA Hort Prin	OH	131	(4)
Basic Soil Sci	SS	231	(4)

GENERAL EDUCATION REQUIREMENTS

Category I: (Pattern 2) Lower division 12 units required.

A. Freshman English I	ENG	104	(4)
B. Advocacy and Argument	COM	204	(4)
C. Freshman English II	ENG	105	(4)
or Report Writing	COM	216	(4)

Category II: (Pattern 2) 16 units required.

A. Trigonometry	MAT	106	(4)
B. Fundamentals of Chemistry	CHM	103	(4)
C. Basic Biology	BIO	115	(5)
D. Principles of Geology	GSC	250	(4)

Category III: 12 units required. Select one course from each area. 4 units may be from Category VII.

Category IV: 12 units required. 4 units may be from Category VII.

A. Starting Your Own Business	OM	103	(4)
B. Select one course from Area B			(4)
C. Select one course from Area C			(4)

Category V: 4 units required.

A. General Psychology	PSY	201	(4)

Category VI: 8 units required. Select one from each group.

Category VII: Upper Division.
See departmental advisor

DIRECTED ELECTIVES

(plus 10 units from:)

DIRECTED DESIGN ELECTIVES

Seminar on Lit of LA	LA	452	(2)
Seminar on Prof Directions	LA	453	(2)
Seminar on LA Research	LA	454	(2)
Seminar on Design Theory	LA	459	(2)
Topics in Land Arc	LA	475	(2)
Hist of West Art	ART	214	(4)
Phil of the Arts	PHL	301	(4)

(or 10 units from:)

DIRECTED PROFESSIONAL ELECTIVES

Landscape Hydraulics	AE	221	(4)
Land Sprink Irr	AE	321	(4)
Drip Irrigation	AE	340	(3)
Turf Management	PA	233	(3)
Land Spec & Estim	PA	416	(4)
Soil Fertility & Fert	SS	233	(4)

Course Descriptions

(Open to LA majors only unless otherwise specified)

LA 101 Introduction to Environmental Design (3)

Introduction to environmental design stressing 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. Two 1-hour lectures, one 3-hour studio. 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. 3 one-hour lectures, 1 three-hour laboratory. 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 the 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, with permission of Instructor.

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) (3)

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. LA 201, 202: 2 lectures, 2 three-hour laboratories. LA 203: 1 lecture, 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. May be taken concurrently with LA 103. Prerequisite: LA 102.

LA 232 Landscape Graphics (3)

Development of communication skills emphasizing perspective and delineation techniques as they relate to landscape architecture. May be repeated once for credit. Laboratory course; 1 lecture, 2 three-hour laboratories. To be taken concurrently with LA 201. Prerequisite: LA 231.

LA 241, 242, 243 Plant Materials and Design (3) (3) (3)

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. 1 lecture, 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 (5) (5) (5)

Application of design concepts and principles to more difficult problems involving a wide range of conditions in the physical environment. 2 lectures, 3 three-hour laboratories. Prerequisites: LA 203; ENG 104, 105. Limited to 5 units per quarter.

LA 322 Regional Landscape History (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. May be taken by non-LA majors with instructor's permission.

LA 331, 332, 333 Landscape Construction (4) (4) (5)

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 documents. For LA 331, 332: 2 lectures, 2 three-hour laboratories. For LA 333: 3 lectures, 2 three-hour laboratories. Prerequisites: MAT 106; LA 203, AE 124, 232.

LA 341 Planting Design (4)

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. Prerequisites: 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 (5) (5) (5)

Processes of design as applied to complex projects in landscape architecture, including proposal, programming, analysis, concept development and presentation. Each student selects an area of concentration: urban, rural, regional, or special problems. 2 lectures, 3 three-hour laboratories. Prerequisite: LA 303.

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. May be taken by non-LA majors with instructor's permission.

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 452 Seminar on the Literature of Landscape Architecture (2)

Review and analysis of the existing body of literature concerning landscape architecture, relationships between man and the natural environment, and man and the designed environment. Seminar, 2 hours.

LA 453 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.

LA 454 Seminar on Landscape Architecture Research (2)

Discussion and analysis of basic research methods; investigation of contemporary research issues in landscape architecture. Seminar, 2 hours.

LA 459 Seminar on Design Theory (2)

Investigation and discussion of design theories in landscape architecture and other design professions. Seminar, 2 hours.

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 475 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. Lecture-discussion—2 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

Charles M. Hotchkiss, *Chair*
Felix R. Barreto
David E. Bess
Charles E. Loggins
Siddhartha Sen
Charles R. Stapleton
Ana'Maria C. Whitaker
Sylvia White
Richard W. Willson

The profession of Urban and Regional Planning works with the critical issues of physical change, and is concerned with environmental, social, and economic improvement. This unique program develops problem-solvers with imagination, desire, and ability to serve people. The curriculum offers classes which seek a balance among the physical, social, economic, ecological, and political forces so important in working with problems of human settlement. Throughout the program, students study real life issues and propose solutions to them. Simply stated, learning current planning theory, practice, and techniques—as they apply to California, the nation and the world —constitutes the essence of the program.

The Bachelor of Science in Urban and Regional Planning has received recognition by the Planning Accreditation Board. For information about the graduate program in Urban and Regional Planning, see the Graduate Program announcement.

QUANTITATIVE RESEARCH MINOR

The Quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Urban and Regional Planning. A full description of this minor is included in the "University Programs" section of this catalog.

CORE COURSES FOR MAJOR *

(Required of all students)

Introduction to the Planning Profession.	URP	101	(4)
Process and Theory of Planning	URP	102	(4)
Public Facilities	URP	103	(4)
Urban Planning Graphics	URP	201	(6)
Urban Design Awareness	URP	202	(5)
Design for Development Planning	URP	203	(5)
Planning Research Methods I	URP	331	(6)
Planning Research Methods II	URP	332	(6)
Intro to Urban Transportation	URP	336	(4)
Evolution of Cities	URP	410	(4)
Planning Policy Analysis	URP	421	(4)
General Plan Survey	URP	431	(5)
General Plan Development	URP	432	(5)
Senior Project	URP	461	(2)
Senior Project	URP	462	(2)
Undergraduate Seminar	URP	463	(2)
Urban Planning Implementation	URP	465	(4)

Choose a minimum of 32 units with approval of advisor from courses listed below:

Evolution of Cities and of Planning in America	URP	411	(4)
Regional Planning	URP	433	(4)
Community Dev. and Urban Revit.	URP	434	(5)
Urban Growth Management	URP	466	(4)
Planning in Developing Nations	URP	475	(4)
Rural and Small Town Planning	URP	481	(4)
Planning for Industrial Development	URP	482	(4)
The Urban Development Process	URP	483	(4)
Neighborhood Revitalization	URP	484	(4)
Urban Design	URP	485	(4)
Computer Applications in Planning	URP	486	(4)
Environmental Factors in Regional Planning	URP	487	(4)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in the major.

SUPPORT & ELECTIVE COURSES

Real Estate Principles and Practice	FRL	106	(4)
Directed Electives			(8)
Unrestricted Electives			(6)

GENERAL EDUCATION REQUIREMENTS

Category I: (Pattern 2) 12 units

A. Freshman English I	ENG	104	(4)
B. Advocacy and Argument	COM	204	(4)
C. Report Writing	COM	216	(4)

Category II: (Pattern 2) 16 units

A. Intro to Statistics	STA	120	(4)
B. Select one course			
C. Select one course			
D. Environmental Geology	GSC	250	(4)

Category III: 12 units

A. Meaning of Architecture	ENV	112	(4)
B. Select one course			
C. Select one course			

Category IV: 12 units

A. Principles of Economics	EC	202	(4)
B. Select one course			(4)
C. Select one course			

Category V: 4 units

General Psychology	PSY	201	(4)

Category VI: 8 units

Select one course from each group.

Category VII: 12 units

See advisor

Course Descriptions

URP 101 Introduction to the Planning Profession (4)

Introduction to the urban and regional planning profession and the issues studied in the undergraduate planning curriculum. Emphasis on planning for Southern California. Includes guest lectures and field trips. Required for all incoming undergraduate planning majors. 3 lectures, 1 two-hour activity.

URP 102 Process and Theory of Planning (4)

Introduction to the processes of urban and metropolitan development. Theories of growth and shifting patterns of human activity systems. The planner as change agent in the context of a pluralistic society. 3 lectures, 1 two-hour activity. Prerequisite: URP 101, ENG 104.

URP 103 Public Facilities (4)

The role of government and private investment in public facilities. The importance of infrastructure in determining urban form and the quality of life. Discussion of planning and evaluation for various service systems. Review of the impact of technology. 3 lectures, 1 two-hour activity. Prerequisite: URP 102.

URP 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.

URP 202 Urban Design Awareness (5)

Theory of environmental design and relationships between natural and man-made environments. Studio problems emphasizing design responses to natural systems. 2 lectures, 3 three-hour laboratories. Prerequisite: URP 201.

URP 203 Design for Development Planning (5)

Design of large scale urban development. Preparation of solutions for subdivision, planned unit development and redesign of urban areas. Study of hillside development, urban infill and environmental review. 2 lectures; 3 three-hour laboratories. Prerequisite: URP 202.

URP 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.

URP 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. Not open to URP majors. 4 lectures.

URP 331 Planning Research Methods I (6)

Problems and methods of urban and regional 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. Prerequisites: URP 102, MAT 105.

URP 332 Planning Research Methods II (6)

Advanced methods of planning research and analysis, study and formulation of proposals for planning problems and planning projects. 4 lectures; 6 hours laboratory. Prerequisite: URP 331. Must be taken immediately following URP 331.

URP 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. Prerequisites: URP 102, MAT 105.

URP 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.

URP 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. Prerequisite: ENG 104.

URP 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. Prerequisite: ENG 104.

URP 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.

URP 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. Two lectures, two seminars. Prerequisite: URP 331, EC 202, COM 216.

URP 431 General Plan Survey (5)

General plan research and survey procedures. Programming for a general plan. 3 lectures, 6 hours of laboratory. Prerequisite: URP 332, COM 216, COM 204.

URP 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 URP 431.

URP 433 Regional Planning (4)

Review of county, regional, state, and national planning. Emphasis on regional planning. 3 lectures. 3 hours of laboratory. Prerequisite: URP 432 or permission of the instructor.

URP 434 Community Development and Urban Revitalization (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 community development programs. 3 lectures, 2 seminar. Prerequisite: URP 332.

URP 441 Field Work (2–3)

Practical application of urban and regional 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.

URP 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 and regional planning field. Project results presented in a formal report. Minimum 60 hours total time per two-unit course. Prerequisite: All required URP 300-level courses, COM 216, successful completion of GWT.

URP 463 Undergraduate Seminar (2)

Intensive study of the legal, ethical, and professional aspects of urban and regional planning in public and private practice. Review of urban and regional planning problems. 2 seminars. Prerequisite: All required URP 300-level courses.

URP 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: URP 332, or graduate student standing.

URP 466 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: URP 332.

URP 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.

URP 481 Rural and Small Town Planning (4)

Theories and methods of planning in small towns and rural communities. The changing role of the traditional small town and agricultural trade center in rural development. Conflicts and contradictions of various development strategies. Rural resettlement programs. 3 lectures, 1 2-hour activity. Prerequisite: URP 434.

URP 482 Planning for Industrial Development (4)

Public policy for development and redevelopment of urban employment centers and industrial areas. Adaptation of physical facilities for economic revitalization. 3 hours lecture, 1 2-hour activity. Prerequisite: URP 332, or graduate student standing.

URP 483 The Urban Development Process (4)

Introduction to the roles of the many participants in the design and development of urban projects. Procedural aspects of development, requests for proposals, methods of finance, project feasibility analysis, program evaluation and review, and government incentives. Prerequisite: URP 203, URP 332. 1 lecture, 3 three-hour laboratories.

URP 484 Neighborhood Revitalization (4)

Delimiting the urban neighborhood. Traditional functions and life cycle of urban neighborhoods. Revitalization policy options and strategies. Public and private sector involvement in neighborhood revitalization. Citizen initiated revitalization programs. 3 lectures, 1 two-hour activity. Prerequisite: URP 434.

URP 485 Urban Design (4)

Design in the planning process, with emphasis on research, analysis and programming for the context of design decisions. Preparation of solutions for variety of urban design decisions. Prerequisite: URP 203. 1 lecture; 3 three-hour laboratories.

URP 486 Computer Applications in Planning (4)

Introduction to the microcomputer and specialized application programs: text processing, data bases, calculations and computer generated graphics. Specific planning applications and the development of templates. Studio preparation of a computer-based planning application program. Prerequisite: CIS 110, URP 332, 1 lecture; 3 three-hour laboratories.

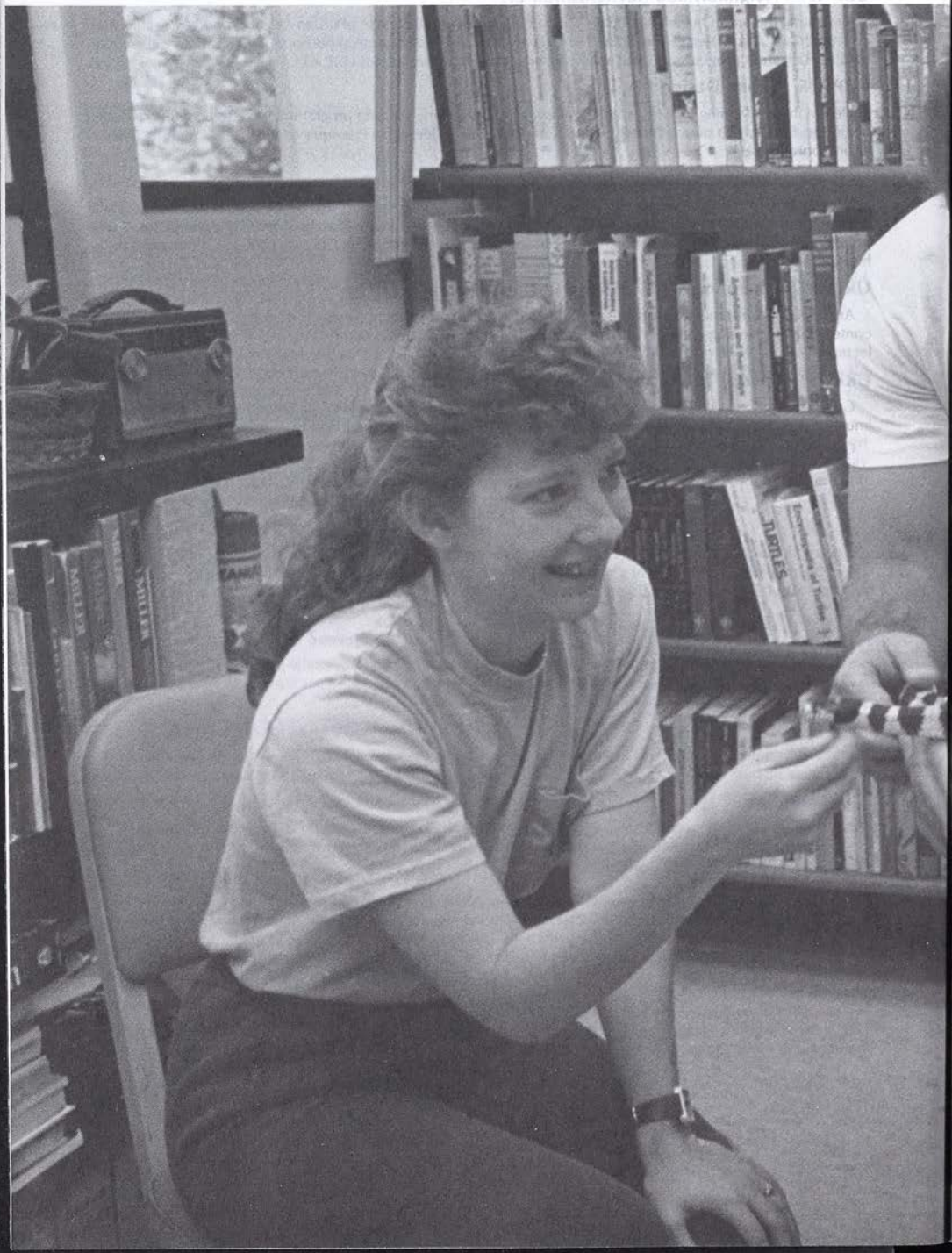
URP 487 Environmental Factors in Regional Planning (4)

Analysis of environmental problems and the regional planning institutions which work to solve them. Review of contemporary planning practices and their application to emerging environmental issues. Prerequisite: URP 332. 4 lectures.

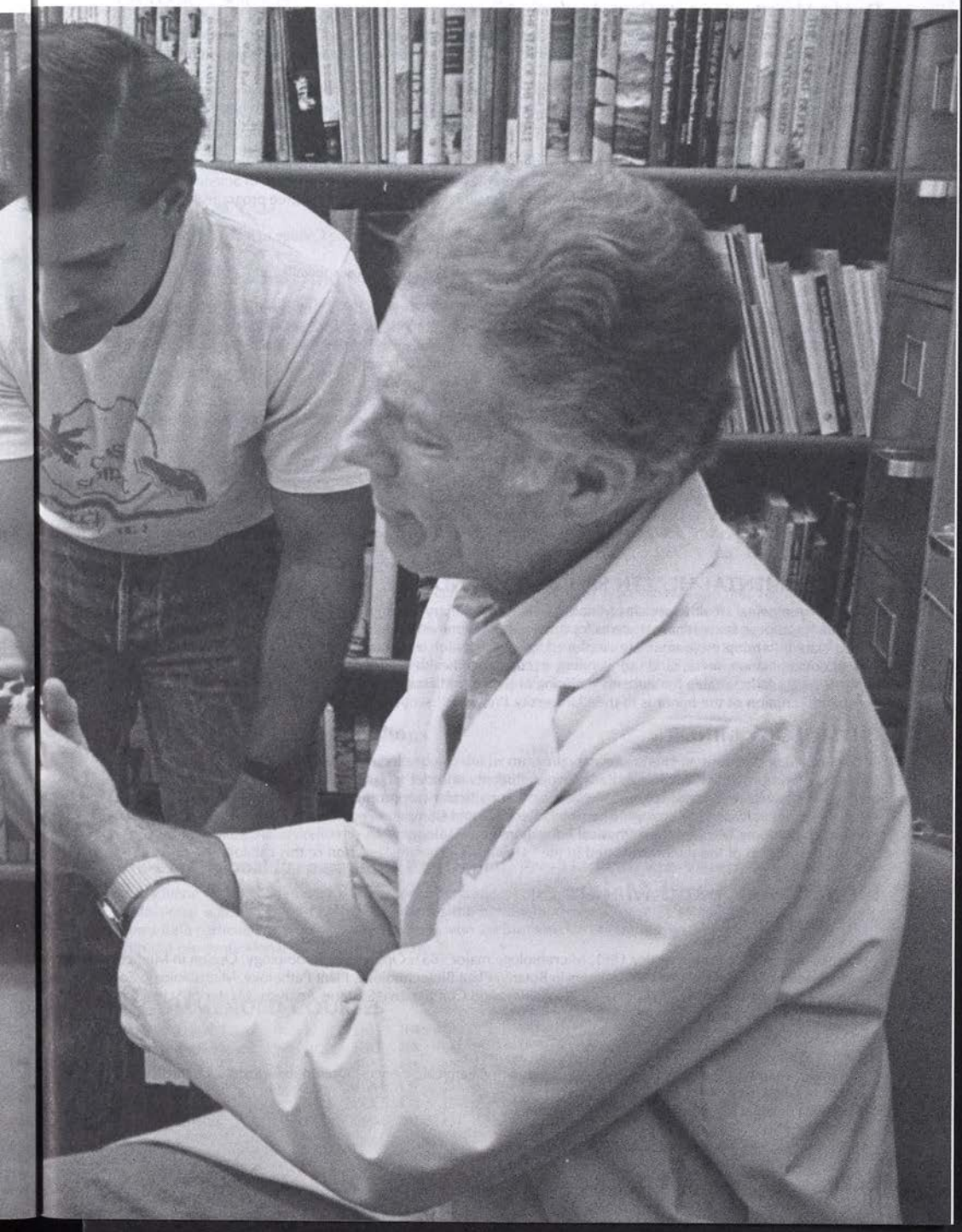
URP 499 Special Topics for Upper Division Students (1–4)

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.



COLLEGE OF SCIENCE



COLLEGE OF SCIENCE

Ray C. Shiflett, *Dean*

Victor P. Abegg, *Associate Dean, Business Affairs*

David J. Moriarty, *Associate Dean, Academic Affairs*

The curricula offered in the College 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 College of Science also offers basic supporting courses for students enrolled in the professional and technological degree programs in other colleges of the university.

Majors in nine fields leading to the bachelor of science degree are offered by the College 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, dental, or veterinary school.

The College of Science actively fosters dialogue 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.

Interdisciplinary General Education (IGE)

Students majoring in the various programs in science are encouraged to take part of their General Education requirements through the Interdisciplinary General Education Program (IGE). This IGE program is specially designed to meet the needs of science students particularly in the areas of writing, critical thinking, humanities and the social sciences.

ENVIRONMENTAL HEALTH SPECIALIST MINOR

The Environmental Health Specialist Minor is an interdisciplinary program which may be pursued by majors in any field. Its purpose is to prepare students for careers as Environmental Health Specialist by meeting the standards for the state internship program. State employed specialists enforce and administer laws governing water, food, and air contamination, noise, land use planning, occupational health hazards, and animal vectors of disease. The minor is particularly suitable for students majoring in Biology, Microbiology, Zoology, and Agricultural Biology.

A full description of the minor is in the "University Programs" section of this catalog.

PHYSIOLOGY MINOR

The Physiology Minor is an interdisciplinary program which can be elected by students majoring in any field. Its purpose is to improve the training and advising of students in order to facilitate their pursuit of careers in biomedical fields utilizing a knowledge of Physiology. It is particularly appropriate for students majoring in Animal Science, Behavioral Sciences, Biology, Chemistry, Electrical and Computer Engineering (Biomedical Engineering), Foods and Nutrition, Microbiology, Physical Education, and Zoology.

A full description of the minor is located in the "University Programs" section of this catalog.

Departments and Majors

BIOLOGICAL SCIENCES

Edward K. Mercer, *Chair*

Biology major (BS); Botany major (BS); Microbiology major (BS): Option in Microbiology, Option in Medical Technology; Zoology major (BS): Minors in Botany, Plant Biotechnology, Plant Pathology, Microbiology, Zoology, Environmental Health Specialist, Physiology, and Comparative Systems Analysis. Master of Science in Biological Sciences.

CHEMISTRY

Patrick W. Mobley, *Chair*

Chemistry major (BS) Option in Chemistry; Option in Chemical Sciences; Option in Industrial Chemistry

Minor in Chemistry

Master of Science in Chemistry

COMPUTER SCIENCE
Bruce Hillam, *Chair*
Computer Science major (BS)
Minor in Computer Systems Organizations, Scientific Computer Programming, and Artificial Intelligence
Master of Science in Computer Science

GEOLOGICAL SCIENCES
John A. Klasik, *Chair*
Geology Major (BS); Earth Sciences Major (BA)
Minor in Geology

MATHEMATICS
V. Merriline Smith, *Chair*
Mathematics Major (BS); Option in Pure Mathematics; Option in Applied Mathematics; Option in Statistics; Option in Secondary Teaching
Minors in Statistics and Mathematics
Master of Science in Mathematics

PHYSICS
Harvey S. Leff, *Chair*
Physics Major (BS)
Physics Minor

Center For Science And Mathematics Education

The Center's purpose is to contribute to the improvement of science and mathematics education in elementary and secondary schools. To this end it coordinates workshops and courses for K-12 teachers and also provides teachers with equipment and other materials for use in their classrooms.

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. For information see Dr. J. Ernest Simpson (3-233).

Science Advisory Office

This office assists students with all academic petitions (withdrawal, reinstatement, dual enrollment, etc.) and questions pertaining to scheduling and general education. All articulation agreements and forms pertaining thereto are also in this office (8-4A).

Science Educational Enhancement Services

The objective of Science Educational Enhancement Services (SEES) is to increase the number of Blacks, Hispanics and American Indians in the sciences and mathematics. The program strives for the retention and graduation of its members by establishing a supportive community among students with these ethnic backgrounds and having technical career goals. SEES services include special faculty advisors in each department of the college, an orientation course for members who are new to the campus, a study center where students can work together, priority consideration to participate in Academic Excellence Workshops (see below) and clubs for preprofessional students from targeted ethnic groups.

Academic Excellence Workshops

An Academic Excellence Workshop is a supplement to certain beginning-level chemistry, mathematics, physics and engineering courses which is open by invitation only. Participants in MEP in the College of Engineering and SEES in the College of Science receive priority consideration as invitees. The Workshop program promotes technical excellence in the subject area while also developing student and communication skills under the guidance of a trained facilitator. An invitation to participate should be regarded as an honor and a unique opportunity.

Pre-Professional Preparation: (Pre-Dental, Pre-Medical, Pre-Veterinary, Other)

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 pre-professional preparation should consult with the pre-professional advisor listed below.

RECOMMENDED COURSES

Freshman English I	ENG	104	(4)
Freshman English II	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)
or			

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	(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)

For additional recommended and support courses, see Pre-professional Advisor:

Chief Health Professions Advisor Dr. David Steele—Medicine, Dentistry, Veterinary (8-7)
Dr. Patrick W. Mobley—Medicine, Dentistry, etc. with Chemistry major

Course Descriptions

SCI 110 Success in Science (2) FW

Orientation to the various majors in the College of Science. Exploration of student and University expectations of science majors. Career opportunities. One-to-one interaction with departmental mentors. Speakers, field trips. Open only to students in Science Educational Enhancement Services (SEES). May be repeated for a maximum of 4 units. 1 lecture, 1 two-hour activity.

SCI 210 Physics Concepts and Activities (4)

Introduction to physics concepts, covering mechanics, heat, sound, light, electricity, magnetism, and properties of matter. Laboratory and demonstration activities appropriate for elementary school teachers are emphasized. 3 lectures, 1 three-hour lab. Prerequisite: MAT 205.

SCI 211 Chemical Sciences (4)

The basic concepts of chemistry and an overview of the applications of chemistry from atomic theory through biochemistry. Laboratory activities include fundamental experiments that can be adopted for elementary school teaching. 3 lectures, 1 three-hour lab.

SCI 212 Geological Sciences (4)

Foundations in the science of Geology and Earth Science with emphasis on applications important in teaching. Lab sessions emphasize experiments useful for elementary school teachers. 3 lectures, 1 three-hour lab.

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. 4 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.

Edward K. Mercer, *Chair*

Ronald D. Quinn, *Coordinator*

Jill P. Adler	J. Curtis Clark	Leslie P. Nyman
Keith E. Arnold	Ronald S. Daniel	Pamela J. Sperry
Jonathan N. Baskin	Bruce L. Firstman	David F. Steele
Gilbert D. Brum	Chris D. George	Glenn R. Stewart
Stephen H. Bryant	George W. Martinek	Laszlo J. Szijj
David P. Campbell	Larry K. McKane	Lenard R. Troncale
Peter Castro	David J. Moriarty	Jia-Hsi Wu

The Biology major 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. For those planning a career as a secondary school teacher a single subject credential in Life Science is required. This credential is obtained by completing coursework in Education and passing the National Teacher Examination. The latter can be waived by taking the courses listed in the Waiver Program. A list of the courses required for the Waiver Program will be found on the next page. See the department chairperson for additional information.

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.

ENVIRONMENTAL HEALTH SPECIALIST MINOR

The Environmental Health Specialist Minor is an interdisciplinary program which may be pursued by majors in any field. Its purpose is to prepare students for careers as Environmental Health Specialists by meeting the standards for the state internship program. State employed specialists enforce and administer laws governing water, food, and air contamination, noise, land use planning, occupational health hazards, and animal vectors of disease. The minor is particularly suitable for students majoring in Biology.

A full description of the minor is in the "University Programs" section of this catalog.

PHYSIOLOGY MINOR

The Physiology Minor is an interdisciplinary program which can be elected by students majoring in any field. Its purpose is to improve the training and advising of students in order to facilitate their pursuit of careers in biomedical fields utilizing a knowledge of Physiology. It is particularly appropriate for students majoring in Biology.

A full description of the minor is located in the "University Programs" section of this catalog.

QUANTITATIVE RESEARCH MINOR

The Quantitative Research Minor is an interdisciplinary program which can be taken by students majoring in any field other than Mathematics. Its purpose is to prepare students to conduct quantitative analyses in their chosen discipline. Students acquire practical experience using statistics, principles of experimental design, survey and data analysis techniques. This minor is particularly suited for students majoring in Biology. A full description of this minor is included in the "University Programs" section of this catalog.

CORE COURSES FOR MAJOR *

(Required of all students)

Env. Conservation	BIO	201	(3)
Genetics	BIO	303	(4)
Cell, Molecular, and Dev. Biol	BIO	310	(4)
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)
Upper Division courses in Biological Sciences			(8)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

College Chemistry	CHM	105	(3)
College Chemistry	CHM	106	(3)
College Chemistry Laboratory	CHM	141	(1)
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)
Intro to Statistics	STA	120	(4)
Approved electives			** (15)
Free Electives			(17)

Students considering graduate work or professional schools, see recommended courses for pre-professional preparation. (p. 445)

* A 2.0 cumulative GPA is required in core courses in order to receive a degree in this major.

** Approved electives include all 200, 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:

A. Freshman English I	ENG	104	(4)
B. Advocacy and Argument	COM	204	(4)
C. Freshman English II	ENG	105	(4)

Category II:

A. College Algebra	MAT	105	(4)
B. College Chemistry	CHM	104	(3)
C. Basic Biology	BIO	115	(5)
D. Principles of Evolution	BIO	213	(4)

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 the following:
BIO 205, CPU 201, CPU 202 *or* PSY 201 ..... (4)

Category VI:

Select one course from each group 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)

WAIVER PROGRAM

(Teaching Credential—Life Science)

Basic Biology	BIO	115	(5)
Principles of Evolution	BIO	213	(4)
Genetics	BIO	303	(4)
Principles of Ecology	BIO	325	(4)
Cellular Physiology	BIO	435	(4)
or Plant Physiology	BIO	422	(5)
or Animal Physiology	ZOO	424	(5)
Senior Seminar	BIO	490	(1,1)
Plant Structures & Functions	BOT	124	(5)
Plant Morphology	BOT	125	(5)
Basic Microbiology	MIC	201	(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)
College Chemistry Lab	CHM	141	(1)
College Chemistry Lab	CHM	142	(1)
College Chemistry Lab	CHM	143	(1)
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)

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. Courses approved for CR/NC grading designated by (nonmajors only).

BIO 100 Fundamentals of Biology (4) F

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. *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. *Staff.*

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, George.*

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 lecture-problems. Prerequisite: BIO 110, 115, or equivalent. *Quinn, Stewart.*

BIO 205 Biological Perspectives on Contemporary Life (4) FWSp

A course designed to enable students to make effective decisions for quality lifestyles by gaining practical knowledge and understanding of the roles that diet, stress, drugs, disease, heredity, sexuality, environmental pollution, and the normal life processes of aging and death play in our lives. 4 lecture-discussions. Prerequisite: BIO 110 or BIO 115. *George, Quinn.*

BIO 213 Principles of Evolution (4) FWSpSu

Introduction to plant and animal evolution. 4 lecture-problems. Prerequisite: BIO 110, 115, or equivalent. *Firstman, Troncale.*

BIO 220 Introduction to Marine Biology (4) FWSp

Introduction to life in the oceans. General survey of its living resources, ecology of its major environments, impacts of man, and applications of technology to the exploitation of its living resources. 3 lecture-problems. 1 three-hour laboratory (several weekend field trips required). *Arnold, Baskin, Castro.*

BIO 225 Microtechnique (3) W

Methods of preparing plant and animal tissues for microscopic study. 1 lecture-problem. 2 three-hour laboratories. Prerequisite: BIO 115. *Campbell.*

BIO 230 Horizons in Biotechnology (1) FSp

A survey of the various applications of biotechnology on today's industrial community. Topics include theoretical explanations of recent biotechnological developments, discussion of problems encountered in production, manufacturing, and marketing of new products, and future directions in biotechnological research. The course will feature guest lecturers from various biotechnological industries. 1 lecture. Prerequisites: none. *Adler.*

BIO 256 Microcomputer Applications in Biology (2) FSp

Use of microcomputers in the acquisition, manipulation, and presentation of numeric and textual data in biology. 1 lecture-problem, 1 three-hour laboratory. Prerequisites: BIO 110 or BIO 115, CS 101 or CS 111. *Clark, Moriarty.*

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-problems, laboratory problems, or a combination of both. *Staff.*

BIO 300 Human Heredity (4) FWSp

Nontechnical introduction to hereditary principles with emphasis on humans. Hereditary diseases, blood types, mutations, radiation, and evolution. For nonmajors. 4 lecture-problems. Not open to students with credit for BIO 303. Prerequisite: BIO 110 or equivalent. *Bryant.*

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 lecture-problems. May be used for Approved Elective but not Upper Division Core credit by students with majors in the Biological Sciences Department. *Adler, Daniel, George, McKane, Steele.*

†BIO 302 Biology of Cancer (4) SP

Topics include cancer and the cell, nutrition and cancer, lung cancer, skin cancer, chemotherapy, immunotherapy, present research and psychosocial aspects. Material is presented by guest lecturers including specialists and cancer patients. May be used for Approved Elective but not Upper Division Core credit by students with majors in the Biological Sciences Department. 4 lecture-problems. Prerequisites: BIO 110, BIO 115 or consent of instructor. *Troncale.*

BIO 303 Genetics (4) FWSpSu

Principles of heredity. 4 lecture-problems. Prerequisite: BIO 110 or 115. *Bryant, 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 lecture-problems. Prerequisite: BIO 110 or equivalent. *Mercer.*

BIO 306 Biological Systematics (3) FW

Interpretation of biological variability; kinds and origins of organismic variation, the species and speciation, phylogenetic inference, classification and nomenclature. 3 lecture-problems. Prerequisite: BOT 124 or 125, ZOO 137 or 138, BIO 213; recommended: BIO 303, 325. *Clark.*

BIO 310 Cell, Molecular, and Developmental Biology (4) FSp

Cellular processes and molecular interactions, including transport, chemical signaling, cell-cell adhesion, intercellular communication, support and movement, energy conversions, digestion, assembly of macro-molecules and organelles, gene control in prokaryotes and eukaryotes; cellular mechanisms of development. 4 lecture-problems. Prerequisites: BIO 115, BIO 303, CHM 104–106 or equivalent, CHM 201 or equivalent. *Sperry.*

BIO 311 AIDS: Current Topics and Concerns (4) FSp

Worldwide distribution and prevalence in the United States, transmission, groups at risk, sexual practices, current and future research, effects on the immune system, testing, legal consequences, counseling, and availability of support groups. Selected topics will be presented by guest speakers. Open to all majors for credit/no credit. May be used for Approved Elective but not Upper Division Core credit by students with majors in the Biological Sciences Department. 4 lectures. Prerequisite: BIO 110, BIO 115, or equivalent, or consent of instructor. *Adler, George, Steele.*

BIO 325 Principles of Ecology (4) FWSpSu

A study of ecosystems; the interactions between organisms and environment. 3 lecture-problems, 1 three-hour laboratory. 3 one-day weekend field trips. Prerequisite: BIO 115. *Moriarty, Quinn, Sziij.*

BIO 333 Genetics Laboratory (1) WS

Hands on experience in collection and analysis of genetic data. Students will master methodologies for handling DNA, fruit flies and chromosomes. Solution of genetics problems using current analysis techniques. 1 three-hour laboratory. Prerequisite: BIO 303. *Bryant.*

BIO 400 Special Problems for Upper Division Students (1–2) FWSpSu (Also, BOT, MIC, or ZOO 400)

Individual or group investigation of selected problems or supervised attendance for juniors and seniors at department seminars. Discussions and reports required. Enrollment requires: 1) Prior arrangement with a faculty member. 2) Completion of a supervisory form available from the Biological Sciences Department Office. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff.*

BIO 403 Human Genetics (4) W

Study of single and multi gene human diseases, chromosome aberrations, sex determination, immunogenetics, genetic counseling. Problem solving, and mastering the methodology of human karyotyping. 3-lecture-problems, 1 three-hour laboratory, 1 or 2 field trips. Prerequisite: BIO 303. *Bryant.*

BIO 410 Biophysics (3) W

Concepts and mechanisms involved in the interpretation of biological systems. A description of living processes in physical terms. 3 lecture-problems. (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 lecture-problems. Prerequisite: MAT 105, STA 120, and junior standing. *Bryant, Moriarty.*

BIO 418 Population Ecology (3) F

Factors affecting the abundance and distribution of animal populations in their natural environment. 2 lecture-problems, 1 three-hour laboratory. Prerequisite: BIO 325 and 411. *Szijj.*

†BIO 420 Water Pollution Biology (3) SP

Major pollutants and their effects on aquatic organisms, human health, and use of water resources. 3 lecture-problems. 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. *Bryant, Campbell.*

†BIO 423 General Cytology (4) F

General structure and ultrastructure of the cell. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: BOT 124, ZOO 138. *Nyman.*

BIO 425 Chaparral Biology (4) W

Structure, function, and management of the California chaparral. 3 lecture-problems, 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 lecture-problems, 2 three-hour laboratories. Prerequisite: BOT 125, ZOO 137 or consent of instructor. *Mercer.*

BIO 431 Radiation Biology (4) Sp

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 lecture-problems, 1 three-hour laboratory. Prerequisite: 12 units of Biological Sciences, 8 units of Chemistry, 8 units of Physics. *Nyman.*

BIO 435 Cellular Physiology (4) FSp

Physical mechanisms at the cellular level. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: CHM 201 or 314. *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 lecture-problems. *Firstman.*

BIO 441 Internship in Biology (1–2) FWSpSu

On-the-job training in student's area of interest or academic and practical experience in assisting and tutoring in laboratory or field courses. Limited to upper division students in good standing. Written evaluation from job supervisor or instructor required upon completion. Credit for assisting or tutoring limited to a maximum of 3 units to be earned in at least two courses. Total credit for on-the-job training limited to 6 units. Prerequisite: Internship coordinator or laboratory instructor approval of student's application for internship credit (forms available from Biological Sciences Department). *Staff.*

BIO 442 Marine Ecology (5) Sp

Structure and function of marine ecosystems with emphasis on littoral environments. 3 lecture-problems, 2 three-hour laboratories. Prerequisite: BIO 325, or consent of instructor. *Arnold.*

BIO 445 Population Genetics (4) W

Theory and experimental results in population genetics; the interrelation of population genetics and ecological and evolutionary studies. 3 lecture-problems, 1 three-hour laboratory. Possible required field trips. Prerequisites: BIO 303 and BIO 411. *Bryant.*

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 lecture-problems. 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 lecture-problems, 2 three-hour laboratories. Prerequisite: Consent of instructor. *Sperry, Troncale.*

BIO 455 Molecular Biology of Recombinant DNA (4) F

Molecular biology of nucleic acids including isolation, purification and analysis of virus, plasmid, procaryotic and eucaryotic DNA; restriction endonuclease analysis, Southern blotting and molecular hybridization with radioactive probe; concepts on strategies of gene cloning and usefulness of cloned genes. 2 lecture-problems, 2 three-hour laboratories. Prerequisites: BIO 303, MIC 201, and CHM 321 or consent of instructor. *Pal.*

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-problems, laboratory problems, 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.

Edward K. Mercer, *Chair*

Leslie P. Nyman, *Coordinator*

Keith Arnold	Gilbert D. Brum	Edward K. Mercer
Lawrence M. Blakely	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 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 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.

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)

Genetics	BIO	303	(4)
Cell, Molecular, and Dev. Biol	BIO	310	(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	436	(4)
Plant Ecology	BOT	421	(4)
Plant Physiology	BOT	422	(5)
Phycology	BOT	433	(4)
or Mycology	BOT	425	(4)
or Mycology	BOT	426	(4)
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	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	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	426	(4)
Approved Electives			** (17)
Free Electives			(4)

Students considering graduate work or professional schools, see recommended courses for preprofessional preparation.

** Approved electives include any 200, 300, and 400-level courses in the Biological Sciences Department not specifically designed for non-majors. Approved electives also include : all 200, 300 and 400-level chemistry courses; PHY 304, 340 and 410; MAT 114, 115 and 116; OH 131, 323, 422 and 427; AGR 221, 224, 404 and 421; STA 120. See advisor for approval of other courses offered by other departments.

GENERAL EDUCATION REQUIREMENTS

Category I:

A. Freshman English I	ENG	104	(4)
B. Advocacy and Argument	COM	204	(4)
C. Freshman English II	ENG	105	(4)

Category II:

A. College Algebra	MAT	105	(4)
B. College Chemistry	CHM	104	(3)
C. Basic Biology	BIO	115	(5)
D. Principles of Evolution	BIO	213	(4)

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:
BIO 205, CPU 201, CPU 202 *or* PSY 201 ..... (4)

Category VI:
Select one course from each group 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)

*A 2.0 cumulative GPA is required in core courses in order to receive a degree in this major.

BOTANY MINOR

Required Courses (all students)
Minimum units—32
Minimum upper division units—12

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)
California Flora	BOT	343	(3)
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)
Plant Nematology	BOT	423	(4)
Principles of Ecology	BIO	325	(4)
Mycology	BOT	425	(4)
Mycology	BOT	426	(4)
Phycology	BOT	433	(4)
Morphology of Embryophytes	BOT	434	(5)
Plant Taxonomy	BOT	436	(4)
Diagnosis and Control of Plant Diseases.	BOT	440	(4)
Methods in Plant Pathology	BOT	441	(4)
Elements of Organic Chemistry	CHM	201	(3)
Organic Chemistry ***	CHM	314	(3)

*Prerequisite: BIO 325.

**Prerequisite: CHM 201 or consent of instructor.

***CHM 317 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 BIOTECHNOLOGY MINOR

May be taken by students majoring in Botany.
The following courses are required for the minor.

Plant Pathology *	BOT	323	(4)
Plant Genetics * **	BOT	403	(4)
Plant Physiology *	BOT	422	(5)

Any of the following courses may be taken to complete the minor.

Seed Production ***	AGR	331	(4)
Plant Breeding **	AGR	404	(4)
Concepts of Molecular Biology	BIO	450	(4)
Molecular Biology Techniques	BIO	451	(5)
Mycology	BOT	426	(4)
Methods in Plant Pathology	BOT	441	(4)
Plant Tissue Culture	BOT	456	(3)

Minimum units: 30

*Prerequisite: BOT 124.

**Prerequisite: BIO 303.

***Prerequisites: AGR 122 and AGR 221 or AGR 226.

PLANT PATHOLOGY MINOR

May be taken by students majoring in Botany.
Required Courses (all students)
Minimum units—32
Minimum upper division units—12
The following courses are required for the minor.

Basic Biology	BIO	115	(5)
Plant Structures and Functions	BOT	124	(5)
or Plant Morphology	BOT	125	(5)
Plant Pathology	BOT	323	(4)
Diagnosis and Control of Plant Diseases.	BOT	440	(4)
or Methods in Plant Pathology	BOT	441	(4)

At least two of the following courses must be completed in addition.

Diagnosis and Control of Plant Diseases.	BOT	440	(4)
Methods in Plant Pathology	BOT	441	(4)
Plant Anatomy	BOT	435	(4)
Mycology	BOT	425	(4)
Plant Physiology*	BOT	422	(5)
Mycology	BOT	426	(4)

Any of the above or following courses may be used to complete the minor.

Plant Nematology	BOT	423	(4)
Diseases of Ornamental Plants	OH	427	(4)
Diagnosis of Ornamental Plant Growth Problems	OH	437	(4)
Crop Diseases	AGR	421	(4)
Citrus Diseases **	FI	226	(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 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 angio-sperms. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 115. *Nyman, Arnold, Clark*

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. Instruction is by lecture-problems, 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 lecture-problems 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 lecture-problems, 1 three-hour laboratory. *Brum*

BOT 323 General Plant Pathology (4) FWSp

Principles of the nature, diagnosis, and control of plant diseases caused by bacteria, fungi, nematodes, viruses, and physiological factors. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: BOT 124 or 125. *Stoner*

BOT 343 California Flora (3) Sp odd-numbered years

Identification of California wildland plants using dichotomous keys. Recognition of common plant families. Overview of the geographic distribution of plants in southern California. 1 lecture, 2 three-hour labs, required field trips. Prerequisites: BIO 115 or BIO 110 and BIO 111. Recommended course: BOT 124. *Clark*

BOT 400 Special Problems for Upper Division Students (1–2) FWSpSu

Individual or group investigation of selected problems or supervised attendance for juniors and seniors at department seminars. Discussions and reports required. Enrollment requires: 1) Prior arrangement with a faculty member. 2) Completion of a supervisory form available from the Biological Sciences' Department Office. Total credit limited to 4 units, with a maximum of 2 units per quarter. *Staff*

BOT 403 Plant Genetics (4)

Principles of plant inheritance and reproduction. Discussion of cytogenetics, population genetics, cytoplasmic inheritance, and gene transfer. Introduction to the methods of plant biotechnology. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: BOT 124, BIO 303. *Blakely, Campbell, Clark, Nyman.*

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 lecture-problems, 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 lecture-problems, 2 three-hour laboratories. Prerequisites: CHM 105 and BOT 124. *Blakely, Wu*

BOT 423 Plant Nematology (4) W

Classification, morphology, biology, and control of important plant parasitic nematodes. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: BIO 115. *Mercer* May be Taken on a CR/NC basis.

BOT 425 Mycology (4) F

Morphology, physiology, culture, pathology, taxonomy, and general biology of Acrasiales, Labyrinthulales, Myxomycetes, Oomycetes, and Zygomycetes. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: BOT 124 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 lecture-problems, 2 three-hour laboratories. Prerequisite: BOT 124 or 125 or consent of instructor. *Stoner*

BOT 433 Phycology (4) F

Morphology, taxonomy, ecology, and physiology of marine and freshwater algae. Emphasis on local marine habitat. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: BOT 124, BOT 125. *Arnold*

BOT 434 Evolution of Plants (5) F

Evolution of plants as illustrated by the comparative morphology, reproductive patterns, and fossil record of green algae, bryophytes, and vascular plants. 3 lecture-problems, 2 three-hour laboratories. Prerequisite: BOT 124, BOT 125, BIO 213, or consent of instructor. *Clark*

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 lecture-problems, 2 three-hour laboratories. Prerequisite: BOT 124 or BOT 125. *Clark, Nyman*

BOT 436 Plant Taxonomy (4) Sp even-numbered years

Principles of classification and nomenclature of plants, with emphasis on the angiosperms. 2 lectures, 2 three-hour labs. Prerequisite: BOT 124 or BOT 343. *Clark*

BOT 440 Diagnosis and Control of Plant Diseases (4)

Principles and practice in the diagnosis of plant diseases and in the prescription of control measures; cultural remedies, disease management, and integrated controls; field practice; and a review of advances in plant pathology. 2 lecture-problems, 2 three-hour laboratories. Field trips required. Prerequisite: BOT 323. *Stoner*

BOT 441 Methods in Plant Pathology (4)

Laboratory and greenhouse methods for isolation, identification, inoculation, and disease assessment for plant pathogenic bacteria, fungi, and viruses which are plant pathogens. Emphasis on screening procedures and other experimental skills. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: BOT 323. *Stoner*

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-problem, 2 three-hour labs. Prerequisite: BOT 422. *Nyman, 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-problem, laboratory, or a combination of both.

CHEMISTRY

Patrick Wm. Mobley, *Chair*

Victor P. Abegg	Elisheva Goldstein	Walter Maya
Kenneth H. Anderson	George Gutnikov	Charles Millner
Phillip Beauchamp	David A. Haner	Earl L. Pye
Fredrick Bet-Pera	Paul C. Hiemenz	Nelson Scott
Charles Bowen	Keith A. Howard	J. Ernest Simpson
Ruth J. Bowen	Yu-Ping Hsia	Arnulf Vollmar
David Brown	Michael L. Keith	Edward D. Walton
Vasu Dev	Mary Zi-ping Luo	Frederick C. Westall

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 choosing one of three rigorous tracks or options of study 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.

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.

The "industrial chemistry" option is designed for those students who plan a career in the chemical industries and businesses. Option courses have been chosen to provide some background in material sciences as well as industrial chemistry. Restricted elective packages create a flexible program which will meet a variety of career goals.

The baccalaureate degree in chemistry earned by following any of the options may be certified by the American Chemical Society as having met its standards for professionalism at the undergraduate level provided that a suitable pattern of electives is chosen. Students should consult with departmental advisors to determine which courses are required in their option for certification.

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. This work experience is an integral part of the Industrial Chemistry Option. Additional details will be found listed at the beginning of the College 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.

For those planning a career as a secondary school teacher a single subject credential in Physical Science is required. This credential is obtained by completing coursework in Education and passing the National Teacher Examination. The latter can be waived by taking the courses listed in the Waiver Program. See the department chairperson for additional information.

Students interested in becoming members in the American Chemical Society may join the Student Affiliates of the American Chemical Society. Additional information can be obtained from the Chemistry Department.

ONE YEAR MASTER OF SCIENCE PROGRAM: The department offers a Master's degree which can be completed in five years of combined undergraduate and graduate study. Should a student decide to pursue this program a decision should be made in the beginning of the junior year so that a departmental petition may be initiated. The petition will outline the tentative program for the 4th and 5th years and should be planned together with completion of appropriate petitions to the Office of Graduate Studies.

Two notable features are associated with the program. 1) students will be eligible to take selected graduate courses in their senior year, and 2) the senior project which is required of all Chemistry majors can be extended into an appropriate research problem which would be the subject of the student's master's thesis.

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)
Spectroscopic Methods	CHM	342	(4)
Separation Methods	CHM	343	(4)
Electroanalytical Methods	CHM	344	(4)
Physical Chemistry Lab	CHM	352	(2)
Organic Analysis	CHM	424	(4)
Senior Research Project	CHM	491	(3)

*A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Senior Research Project..... CHM 492 (3)
Undergraduate Seminar..... CHM 493 (2)
Advanced Chemistry Electives.....(6)
(Two elective courses, 400-level or higher excluding CHM 400, 424, 491, 492, 493, 499. For the Industrial Chemistry Option only, choose from the following: CHM 402, 409, 413, 422, 442, 446 or 452.)

OPTION COURSES FOR MAJOR *

(Required for specific options)

CHEMISTRY

Physical Chemistry..... CHM 311 (3)
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)

INDUSTRIAL CHEMISTRY

Physical Chemistry..... CHM 304 (4)
and Physical Chemistry..... CHM 305 (3)
or Physical Chemistry..... CHM 311 (3)
and Physical Chemistry..... CHM 312 (3)
and Physical Chemistry..... CHM 313 (3)
Chemistry in Industry..... CHM 340 (4)
Elem of Biochemistry..... CHM 321 (4)
or Biochemistry..... CHM 327 (4)
or Inorganic Chemistry..... CHM 401 (3)

SUPPORT AND ELECTIVE COURSES

(Required of all students)

Pascal..... CS 120 (4)
Calculus & Analytic Geometry..... MAT 115 (3)
Calculus & Analytic Geometry..... MAT 116 (4)
General Physics..... PHY 132 (3)
General Physics Lab..... PHY 152 (1)
General Physics..... PHY 133 (3)
General Physics Lab..... PHY 153 (1)
CHEMISTRY OPTION
FORTRAN..... CS 125 (4)
Differential Equations..... MAT 216 (4)
Electives, unrestricted..... (23–25)
CHEMICAL SCIENCES OPTION
FORTRAN..... CS 125 (4)
or Elementary Statistics with Applications..... STA 120 (4)
* Electives, restricted..... (14–20)
Electives, unrestricted..... (19–25)

INDUSTRIAL CHEMISTRY OPTION

FORTRAN CS 125 (4)
or Data Structures for Engineers..... CS 233 (4)
Statistical Methods in Engineering and Physical Science STA 309 (3)
Mtrl. Sci. and Eng..... MTE 207 (3)
Mrtl. Sci. and Eng. Lab. MTE 217 (1)
** Co-op Ed..... SCI 470 (4)
or Co-op Ed..... SCI 470 (2)
and Co-op Ed..... SCI 471 (2)
* Electives, restricted.....(42–49)
Electives, unrestricted.....(2–9)

* Consult the Chemistry Department for details and restrictions.

** If a suitable Co-op position is not available an additional advanced chemistry elective should be taken.

GENERAL EDUCATION REQUIREMENTS

Category I:
A. Freshman English I..... ENG 104 (4)
B. and C. Consult the catalog *..... (8)
Category II:
A. Calculus & Analytic Geom..... MAT 114 (3)
B. General Physics PHY 131 (3)
General Physics Lab..... PHY 151 (1)
C. Basic Biology..... BIO 115 (5)
D. General Chemistry..... CHM 111 (3)
General Chemistry Lab..... CHM 151 (1)
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 course. **** Minimum total.....(4)
Category VI:
Select one course from each area. Minimum total.....(8)
Category VII:
Upper division. Minimum.....(8)
Consult the Chemistry Department or an advisor about the specific groups of courses allowed in this category.

* For Industrial Chemistry Option: A. ENG 104, B. COM 204, C. COM 219.

** A reading knowledge of a foreign language, especially German, is strongly recommended for students planning advanced study in science.

*** For Industrial Chemistry Option: A. EC 201.

**** For Industrial Chemistry Option: PSY 201.

CHEMISTRY MINOR

Minimum units 29
Minimum upper-division units 12
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 (3)

Chemistry Electives ..... (5)
(Two courses 300-level or higher excluding CHM 400, 461, 462, 463, 499.)

WAIVER PROGRAM

(Teaching Credential—Physical Science)

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)
Elem of Physical Chemistry	CHM	304	(4)
Elem of Physical Chemistry	CHM	305	(3)
Organic Chemistry	CHM	314	(3)
Organic Chemistry	CHM	315	(3)
Organic Chemistry	CHM	316	(3)
Organic Chemistry Lab	CHM	317	(1)
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Spectroscopic Methods	CHM	342	(4)
Separation Methods	CHM	343	(4)
Electroanalytical Methods	CHM	344	(4)
Physical Chemistry Lab	CHM	352	(2)
Organic Analysis	CHM	424	(4)
Senior Research Project	CHM	491	(3)
Senior Research Project	CHM	492	(3)
Undergraduate Semihar	CHM	493	(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)
Principles of Geology	GSC	111	(3)
Historical-Geology	GSC	112	(3)
Principles of Geology Lab	GSC	141	(1)
Principles of Geology Field Trips	GSC	142	(1)
Historical Geology Lab	GSC	151	(1)
Basic Biology	BIO	115	(5)
Pascal	CS	120	(4)
Fortran	CS	125	(4)
Analytic Geometry & Calculus	MAT	114	(3)
Analytic Geometry & Calculus	MAT	115	(3)
Analytic Geometry & Calculus	MAT	116	(4)

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. 3 lecture-problems. 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. 3 lecture-problems. 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. 1 three-hour laboratory. 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. 1 three-hour laboratory. 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 lecture-problems. Prerequisite: CHM 105 or 112. Concurrent: CHM 250.

CHM 221 Quantitative Analysis (4) FWSpSu

Fundamentals of gravimetric and volumetric analysis. Focus on laboratory work, with class discussion supplying supporting theory. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: CHM 106 or 113. Students are advised to take 221 as soon as possible after completing either 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) FW

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 (3) (3) (3) F&Su, W&Su, Sp&F

Properties of gases, kinetic molecular theory, chemical thermodynamics, phase equilibria, solutions, electrochemistry, chemical kinetics, atomic and molecular spectroscopy, photochemistry, colloids and macromolecules. To be taken in sequence. 3 lecture-problems. Prerequisite: MAT 216 or 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. 3 lecture-problems. 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) FWSpSu

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-problems, 1 three-hour laboratory. Prerequisite: CHM 201 and 250, or CHM 315 and 317.

CHM 327, 328, 329 Biochemistry (4) (4) (4) F&W, W&Sp, Sp&Su

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 lecture-problems, 2 three-hour laboratories. Prerequisite: CHM 221 and 327 or 321.

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, biotechnology, pharmaceuticals, food, inorganics, polymers, aerospace, and metal industries. Interfaces with economics, patents, chemical engineering, and communication. Guest speakers and plant visits. 4 lecture-problems. Prerequisite: CHM 106 or 113 and 201.

CHM 342 Spectroscopic Methods (4) (F)

Theory and practice of modern analytical techniques based primarily on optical spectroscopy such as UV, IR, AAS, AFS, AES, and fluorescence. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: CHM 221.

CHM 343 Separation Methods (4) (W)

Theory and practice of modern analytical separation methods primarily encompassing various chromatographic techniques. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: CHM 221.

CHM 344 Electroanalytical Methods (4) (Sp)

Theory and practice of modern analytical electrochemistry, with particular emphasis on potentiometry, voltammetry, amperometry, coulometry, chronopotentiometry and cyclic and pulse methods. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: CHM 221.

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-problem, 1 three-hour laboratory. Prerequisite: CHM 344.

CHM 352 Physical Chemistry Laboratory (3) W

Laboratory experiments illustrating principles of physical chemistry. 2 three-hour laboratories and one recitation/problem session. Prerequisite: CHM 221; CHM 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 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 Solution Equilibria in Analytical Chemistry (2) F

Study of advanced acid-base theory, complexation, nonaqueous acid-base, solvent extraction, and ion-exchange equilibria. 2 lectures. Prerequisite: CHM 313 or 305.

CHM 422 Organic Synthesis (4) W, even years

Theoretical and practical study of synthetic strategies in organic chemistry. 2 lecture-problems, 2 three-hour laboratories. Prerequisites: CHM 221, 316 and 319.

CHM 423 Physical Organic Chemistry (4) W, odd years

Theoretical and practical study of experimental techniques used by organic chemists to investigate problems in reaction mechanisms, catalysis, solution chemistry, and substituent effects. 2 lecture-problems, 2 three-hour laboratories. Prerequisites: CHM 221, 316 and 319 and 313 *or* 305.

CHM 424 Organic Analysis (4) FSp

Structure determination of organic compounds by elemental and functional group analysis using classical methods and modern chromatographic and spectroscopic methods. 2 lectures, 2 three-hour laboratories. Prerequisites: CHM 221, 316 and 319.

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.

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 453 Recombinant DNA Biochemistry (3) Sp

Fundamental aspects of the biochemistry of Recombinant DNA and its applications to current biochemical research and industry. Includes germane aspects of the chemistry, structure, and biochemistry of RNA and DNA macromolecules. 3 lecture-problems. Prerequisite: CHM 329 or taken concurrently.

CHM 454 Nutrient Biochemistry and Metabolism (3) W, odd years

An advanced course covering the biochemistry of vitamins, minerals, carbohydrates, lipids and proteins. For example: absorption, transport metabolism and storage of these important biochemicals. 3 lecture-problems. Prerequisite: CHM 329 or consent of instructor.

CHM 460 Air Pollution Problems (3) W

Concepts of air pollution: major air pollutants; sources; future problems. 3 lecture-problems. Prerequisite: Senior standing and consent of instructor.

CHM 491, 492 Senior Research Project (3) (3) FWSpSu

Senior level research or project. Individual consultation and supervision. Independent literature review, project design, data collection, and interpretation of results. Formal report. Prerequisite: Minimum GPA of 2.0 in major.

CHM 493 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 P. Hillam, *Chair*
John R. Fisher
Peter A. Laszlo
Chung Lee
Debra A. Lelewer
Hsi-Chiu Liu
Hsun K. Liu
Kenneth A. MacDonald
Craig Rich
H. Norton Riley
Barry I. Soroka
Mandayam Srinivas

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. High school students planning to major in Computer Science should take as much math and science as possible. Entering freshmen who do not meet the prerequisites for the first year calculus sequence (Mat 114–116) should expect to take between one and three quarters longer to graduate. Transfer students should try to take two years of calculus, a year of physics and programming through data structures (equivalent to CS 140, 141, 240). Transfer students without this background should expect to take an additional year to finish the program.

On campus students wishing to change their major to Computer Science must first pass both Mat 114 and CS 140 with a grade of C or better before petitioning for change of major. Computer Science majors on probation or subject to disqualification for three or more quarters may be disqualified at the discretion of the department chair.

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. On prerequisite specifications, all the CS prerequisites must be "C" or better.

CORE COURSES *

(Required of all students)

Introduction to Programming and Problem Solving	CS	140	(4)
Programming with Data Structures	CS	141	(4)
Computer Logic	CS	210	(4)
Data Structures and Algorithms	CS	240	(4)
Memory and File Mangement	CS	241	(4)
Assembly Language Programming	CS	264	(4)
Numerical Methods	CS	301	(4)
Formal Languages	CS	310	(4)
Symbolic Programming	CS	352	(4)
Computer Organization	CS	365	(4)
Microprocessor Systems	CS	405	(4)
Programming Languages	CS	408	(4)
Artificial Intelligence	CS	420	(4)
Operating Systems	CS	431	(4)
Compiler Design	CS	440	(4)
Compiler Design	CS	441	(4)
Computability	CS	450	(4)
Undergraduate Seminar	CS	463	(2)
Computer Science Electives (including 12 units from the following list)			(16)
Design & Analysis of Algorithms	CS	331	(4)
Computer Simulation	CS	390	(4)
Advanced Operating Systems	CS	432	(4)
Database Design	CS	435	(4)
Advanced Computer Graphics	CS	445	(4)
Software Engineering	CS	480	(4)
Software Engineering	CS	481	(4)
Honors	CS	490	(4)

SUPPORT COURSES

(Required of all students)

General Physics	PHY	132	(3)
General Physics	PHY	133	(3)
General Physics Lab	PHY	152	(1)
General Physics Lab	PHY	153	(1)
Analytic Geometry and Calculus	MAT	116	(4)
Linear Algebra	MAT	208	(4)
Calculus of Several Variables	MAT	214	(4)
Applied Probability Theory	STA	330	(4)
Computer Electronics	ECE	353	(4)
Computer Electronics	ECE	354	(4)
. . . complete two of the following courses . . .			
Calculus of Several Variables	MAT	215	(4)
Differential Equations	MAT	216	(4)
Graph Theory	MAT	370	(4)
Combinatorics	MAT	470	(4)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

GENERAL EDUCATION

(Required of all students)

Category I			
Freshman English I	ENG	104	(4)
other			(8)
Category II			
Life Science	BIO	110	(3)
Analytic Geometry and Calculus	MAT	114	(4)
Analytic Geometry and Calculus	MAT	115	(4)
General Physics	PHY	131	(3)
General Physics Lab	PHY	151	(1)
Category ~~II–D~~			(4)
Category III–VI as required by the University			(36)
Category VII			
See Advisor			(8)
UNRESTRICTED ELECTIVES			(0)

MINOR IN ARTIFICIAL INTELLIGENCE

Pascal	CS	120	(4)
Data Structures	CS	230	(4)
Data Structures	CS	231	(4)
Formal Languages	CS	310	(4)
Symbolic Programming	CS	352	(4)
Artificial Intelligence	CS	420	(4)
Cognitive Processes	PSY	332	(4)

Logic and Semantics	PHL	202	(4)
Total units required for the Minor:			32

(Note: the 3 course sequence CS 120, CS 230, and CS 231 in the Artificial Intelligence Minor may be replaced by the 3 course sequence CS 140, CS 141, and CS 240.)

MINOR IN COMPUTER SYSTEMS ORGANIZATION

Required Courses

Pascal	CS	120	(4)
or Fortran	CS	125	(4)
Computer Logic	CS	210	(4)
Assembly Language Programming	CS	264	(4)
Computer Electronics	ECE	353	(4)
Computer Organization	CS	365	(4)
Microprocessor Systems	CS	405	(4)
Operating Systems	CS	431	(4)
Total units required for the Minor:			28

MINOR IN SCIENTIFIC COMPUTER PROGRAMMING

Required Courses

Fortran	CS	125	(4)
Introduction to Programming and Problem Solving	CS	140	(4)
Programming and Data Structures	CS	141	(4)
Data Structures and Algorithms	CS	240	(4)
Memory and File Management	CS	241	(4)
Numerical Methods	CS	301	(4)

Choose 2 of the following courses:

Design and Analysis of Algorithms	CS	331	(4)
Computer Simulation	CS	390	(4)
Numerical Methods in Differential Equations	MAT	402	(4)
Total units required for the Minor:			32

Course Descriptions

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

Computer hardware and software. Interactive programming using Basic. Computer applications, impact of computers on society, responsibilities of the user. 4 lecture-problems. Not open to CS majors. "Hands-on learning of popular Micro computer packages including word processor, spreadsheet and database manager."

CS 120 Pascal (4)

The stored program computer, central processing unit, memory, input/output, control of information flow. Simple data types, loop control, conditional statements, file I/O. Structured data types: arrays, records, sets, strings. Functions and procedures. Problem analysis and algorithm design. 4 lecture-problems. Prerequisites: MAT 105, 106 with grade of C or better, or consent of instructor.

CS 125 FORTRAN (4)

Data types, evaluation of expressions, control statements, functions and subroutines, interactive and file I/O. Program development, documentation, and testing. Problem analysis and algorithm design. Applications to numeric problems and character processing. 4 lecture-problems. Prerequisites: MAT 105, 106 with grade of C or better, or consent of instructor.

CS 140 Introduction to Programming and Problem Solving (4)

Basic concepts of Computer Science, including overview of hardware and software. Programming in a high-level language. Problem analysis and algorithmic design. Prerequisites: MAT 140 with grade of C or better, or concurrent enrollment in MAT 114 or consent of instructor.

CS 141 Programming and Data Structures (4)

Advanced program design and development, documentation and testing of written program. Topics include recursion, static and dynamic implementations of array, stack, queue, character string, sets and trees. Substitutes CS 230 for CS majors. Prerequisite: CS 140 with grade of C or better, or consent of instructor.

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 210 Computer Logic (4)

Boolean algebra with applications to computers and logic design. The Arithmetic Logical Unit, logical properties of flip-flops and sequential machines. Applied projects. 4 lecture-problems. Prerequisites: MAT 105 with grade of C or better, or consent of instructor.

CS 230, 231 Data Structures (4) (4)

Static and dynamic implementation of lists, stacks, queues, trees, sets, and graphs. Search techniques in lists, trees, and tables. Path problems in graphs, spanning trees, traversals, planarity, and coloring. Comparison of sorting methods. String algorithms, array storage, and data compression. 4 lecture-problems. Prerequisites: CS 120, 125 with grade of C or better, or consent of instructor.

CS 233 Data Structures (4)

Algorithmic presentation of data structures and their applications. Not open to CS majors. 4 lecture-problems. Prerequisite: Fortran or Pascal.

CS 240 Data Structures and Algorithms (4)

Advanced topics in tree and graph algorithms. Searching, sorting, hashing. Data compression. Introductory analysis of algorithms. Substitutes CS 231 for CS majors. Prerequisite: CS 141 with grade of C or better, or consent of instructor.

CS 241 Memory and File Management (4)

Various memory management techniques including static and dynamic implementations. File processing environment including hardware considerations. Sequential access, random access and indexed file structures and algorithms. Hierarchical structure, File I/O. Prerequisite: CS 240 with grade of C or better, or consent of instructor.

CS 245 Introductory Computer Graphics (4)

Basic concepts in 2-dimensional graphics. Display devices, programming for vector and raster graphics, language structure and components, 2-dimensional transformations, windowing, clipping, simple hidden line removal, coloring. 4 lecture-problems. Prerequisites: CS 231 or CS 240 with grade of C or better, or consent of instructor.

CS 264 Assembly Language Programming (4)

Assembly and machine coding of computers. Archetypal Von Neumann architecture and cycle of operation, instruction sets, addressing modes, macros and system I/O. Applied programming projects. 4 lecture-problems. Prerequisites: CS 230 or CS 240 with grade of C or better, or consent of instructor.

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 Numerical Methods (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-problems. Prerequisites: MAT 208, 214, CS 120 and CS 125 or 240 with grade of C or better, or consent of instructor.

CS 310 Formal Languages (4)

Regular and context-free grammars and languages, acceptors, ambiguity, closure properties, normal forms, nondeterministic machines, limitations of context-free languages. 4 lecture-problems. Prerequisites: CS 210, CS 230 or CS 240 with grade of C or better, 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-problems. Prerequisite: CS 231 or CS 241 with grade of C or better, or consent of instructor.

CS 350 Ada (4)

Comparison of Ada syntax and program structure with that of Pascal. Data encapsulation, operator overloading, parameterized procedures and records, recursive structures, packages, private types, tasks, and generic units. Program modularity, data abstraction, exception handling, concurrency. 4 lecture-problems. Not open to CS Majors. Prerequisites: CS 120, 231 with grade of C or better, or consent of instructor.

CS 352 Symbolic Programming (4)

Processing of symbolic data with emphasis on applications in artificial intelligence. Concentrates on the Lisp programming language. Topics on the Prolog programming language and object-oriented programming are also covered. 4 lecture-problems. Prerequisite: CS 231 or CS 240 with grade of C or better, or consent of instructor.

CS 354 System Development Languages (4)

Principles of programming in the C and Forth languages with emphasis on the use of these languages as tools to develop efficient and portable programs and applications software. 4 lecture-problems. Prerequisites: CS 231 or CS 240 with grade of C or better, or consent of instructor.

CS 365 Computer Organization (4)

Fundamental characteristics of logical devices used in an architecture. Application of logic devices in a processing systems context. Study and construction of a 4-bit processor. Development and application of instruction sets and microcode. 4 lecture-problems. Prerequisites: CS 264 and ECE 353 with grade of C or better or consent of instructor.

CS 390 Computer Simulation (4)

Overview of computer simulation. Model building, implementation, validation. Discrete and continuous simulation models. Use of the languages GPSS, Simscript, Dynamo. 4 lecture-problems. Prerequisite: CS 125 and STA 330, with grade of C or better 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 Microprocessor Systems (4)

The microprocessor and support integrated circuits (ICs) as a unified system and their programming implications. Study and application of ICs for communications, peripheral adaptors, arithmetic processors, floppy disc and CRT controllers in a system context. 4 lecture-problems. Prerequisite: CS 365 with grade of C or better, 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-problems. Prerequisites: CS 231 or CS 241, and CS 264 with grade of C or better, or consent of instructor.

CS 420 Artificial Intelligence (4)

Heuristic programming, searching problem spaces, theorem proving programs, game playing programs, decision making programs, question answering programs. 4 lecture-problems. Prerequisite: CS 352 with grade of C or better, or consent of instructor.

CS 431 Operating Systems (4)

Modern operating systems overview. Loading, linking, address binding and memory management. Processes and their synchronization primitives, resource management. Monitors and kernels . Multiprogramming and multiprocessing. Concurrent operations and hardware I/O. Deadlock, file management and job control. 4 lecture-problems. Prerequisite: CS 365 and either CS 231 or CS 240 with grade of C or better, or consent of instructor.

CS 432 Advanced Operating Systems (4)

Current trends and issues in the development of operating systems. The role of operating systems in complex architectures. Detailed examination of the internal algorithms and data structures of one or more specific operating systems. 4 lecture-problems. Prerequisite: CS 431 with grade of C or better or consent of instructor.

CS 435 Database System (4)

Database system fundamentals. Physical file organization: SAM, ISAM, DAM and multi-index systems. Data models: relational, network, hierarchial, and E-R. DDL and DML design and implementation. DBMS design issues including interrogation, maintenance, concurrency, recovery, and security. 4 lecture-problems. Prerequisite: CS 231.

CS 440 Compiler Design (4)

Introduction to Compiler design. Lexical analysis, top-down parsing and basic compiling techniques such as syntax-directed translation, simple run-time organization and object code generation. 4 lecture problems. Prerequisites: CS 231 or CS 241, CS 264 and CS 310 with grade of C or better or consent of instructor.

CS 441 Compiler Design (4)

Intermediate Compiler design. Run-time environments, bottom-up parsing, syntax directed translation, intermediate code generation and optimization, object code generation and optimization. 4 lecture problems. Prerequisite: CS 440 with C or better or consent of instructor.

CS 445 Advanced Computer Graphics (4)

Advanced concepts in the design of 3-dimensional graphics. Transformations, curve and patch generation, hidden line and surface removal, shading, animation. Interactive graphics applications in CAD/CAM. 4 lecture-problems. Prerequisites: CS 245 with grade of C or better, or consent of instructor.

CS 450 Computability (4)

Turing machines, RAM machines, primitive and mu recursion, Godel numbering, Church-Turing thesis, decidability, Markov and Post systems, algorithmically unsolvable problems. 4 lecture-problems. Prerequisite: CS 310 with grade of C or better, or consent of instructor.

CS 460 Secure Communication (4)

Public-key systems, digital signatures, ciphers, the Data Encryption Standard, access security, control of information flow. 4 lecture-problems. Prerequisite: Senior standing in Computer Science.

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 students' particular interests. 2 lecture-discussions. Prerequisite: Senior standing in computer science.

CS 480, 481 Software Engineering (4) (4)

Software Engineering Process including requirements engineering, specification techniques, design concepts and methods, software testing and integration concepts, verification and validation, quality assurance and configuration management, post development software evolution and documentation. 4 lecture-problems. Prerequisites: CS 231 or CS 241, and CS 365 with grade of C or better or consent of instructor.

CS 490 Honors (4)

In-depth study of a topic of current interest to computer science. Students will be expected to perform individual research and projects and present their results in class. Enrollment is limited. 4 lecture-problems. Prerequisite: permission of instructor.

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.

GEOLOGICAL SCIENCES

John A. Klasik, *Chair*
David R. Berry — David R. Jessey — Donald W. Tarman
Lawrence J. Herber — Lisa A. Rossbacher

The Geological 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 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.

The Minor in Geology provides an opportunity for students majoring in disciplines other than Geology to receive credit for having completed at least 30 quarter units of concentrated study in Geology. This may improve employment opportunities with Federal agencies, private companies and teaching institutions.

For those planning a career as a secondary school teacher, a single subject credential in Physical Science is required. This credential is obtained by completing coursework in Education and passing the National Teacher Examination. The latter can be waived by taking the courses listed in the Waiver Program. See the department chairperson for additional information.

CORE COURSES FOR MAJOR*

(Required of all students)

GEOLOGY (BACHELOR OF SCIENCE)

Principles of Geology	GSC	111	(3)
Historical Geology	GSC	112	(3)
Principles of Geology Laboratory	GSC	141	(1)
Principles of Geology Field Trips	GSC	142	(1)
Historical Geology Lab	GSC	151	(1)
Geol. Graphics	GSC	175	(2)
Mineralogy	GSC	215	(5)
Hand Specimen Petrology	GSC	219	(4)
Geomorphology	CSC	323	(4)
Optical Mineralogy	GSC	325	(4)
Invertebrate Paleontology	GSC	331	(4)
Stratigraphy	GSC	332	(4)
Structural Geology	GSC	333	(4)
Sedimentary Petrology	GSC	423	(4)
Igneous and Metamorphic Petrology	GSC	424	(3)
Ig. & Met. Petrography	GSC	425	(2)
Igneous and Metamorphic Ore Deposits	GSC	433	(4)
or Sedimentary & Industrial Minerals	GSC	434	
Field Methods	GSC	455	(4)
Senior Thesis	GSC	461	(2)
Senior Thesis	GSC	462	(2)
Senior Seminar	GSC	463	(2)
Summer Field Geology	GSC	490	(8)
Total			(71)

* A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

EARTH SCIENCES (BACHELOR OF ARTS)

Principles of Geology	GSC	111	(3)
Historical Geology	GSC	112	(3)
Principles of Geology Lab	GSC	141	(1)
Principles of Geology Lab	GSC	142	(1)
Historical Geology Lab	GSC	151	(1)
Mineralogy	GSC	215	(5)
Hand Specimen Petrology	GSC	219	(4)
Meteorology *or*	GSC	304	(4)
Climatology	GSC	303	
Geomorphology	GSC	323	(4)
Descriptive Physical Oceanography	GSC	335	(4)
Planetary Geology	GSC	370	(4)
Senior Thesis	GSC	461	(2)
Senior Thesis	GSC	462	(2)
Senior Seminar	GSC	463	(2)
Total			(40)
Plus 19 additional credits in Geological Sciences or Geological Science-related course work. No more than 12 units of non-GSC credits will be accepted in the core.			(19)

SUPPORT AND ELECTIVE COURSES

(Required of specific options)

GEOLOGY (BACHELOR OF SCIENCE)

General Chemistry	CHM	112	(3)
General Chemistry	CHM	113	(3)
General Chemistry Lab	CHM	152	(1)
General Chemistry Lab	CHM	153	(1)
Pascal	CS	120	(4)
or Fortran	CS	125	
Analytic Geom & Calc.	MAT	115	(3)
Analytic Geom & 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 Physics Lab	PHY	151	(1)
General Physics Lab	PHY	152	(1)
General Physics Lab	PHY	153	(1)
Statistics	STA	120	(4)
Total			(37)

(37)
Units to Complete GE ..... (72)
Unrestricted Electives ..... (18)

EARTH SCIENCES

(BACHELOR OF ARTS)

College Chemistry	CHM	105	(3)
College Chemistry	CHM	106	(3)
College Chemistry Lab	CHM	142	(1)
College Chemistry Lab	CHM	143	(1)
College Algebra	MAT	105	(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)
Intro to Stat	STA	120	(4)
Total			(28)

Courses to Satisfy General Education Requirements ..... (72)
Other electives to be approved by advisor generally in Geological Science related fields; e.g., Soils, Civil Engr., Computer Sci. ..... (22)
Unrestricted Electives ..... (5)

GENERAL EDUCATION REQUIREMENTS (BS)

Category I: (follow only one pattern)

A. Freshman English I	ENG	104	(4)
B. Two additional courses from one selected pattern			(8)

Category II:

A. Analytic Geom & Calc	MAT	114	(3)
B. General Chemistry	CHM	111	(3)
General Chemistry LAB	CHM	151	(1)
C. Basic Biology	BIO	115	(5)
D. Environmental Geology	GSC	250	(4)

Category III:
Select one course from each area. Minimum total ..... (12)

Category IV:
Select one course from each area. Minimum total ..... (12)

Category V: ..... (4)

Category VI:
Select one course from each area. Minimum total ..... (8)

Category VII: (Upper Division) Thematic or Depth SEE ADVISOR

GENERAL EDUCATION REQUIREMENTS (BA)

Category I: (follow only one pattern)

A. Freshman English	ENG	104	(4)
B. Two additional courses from one selected pattern			(8)

CATEGORY II:

A. Trigonometry	MAT	106	(4)
B. College Chemistry	CHM	104	(3)
College Chemistry LAB	CHM	141	(1)
C. Basic Biology	BIO	115	(5)
D. Environmental Geology	GSC	250	(4)

CATEGORY III:
Select one course from each area. Minimum total ..... (12)

CATEGORY IV:
Select one course from each area. Minimum total ..... (12)

CATEGORY V: ..... (4)

CATEGORY VI:
Select one course from each area. Minimum total ..... (8)

Category VII: (Upper Division) Thematic or Depth SEE ADVISOR

MINOR IN GEOLOGY

Minimum units 30
Minimum lower-division units 17*
Minimum upper-division units 12

Principles in Geology	GSC	111	(3)
Principles of Geology Lab	GSC	141	(1)
Principles of Geology Field Trips	GSC	142	(1)
Historical Geology	GSC	112	(3)
Historical Geology Lab	GSC	151	(1)
Hand Specimen Petrology	GSC	219	(4)

It is required that the student confer with a minor advisor in the planning and selection of the minor curriculum.

* Excluding GSC 101.

WAIVER PROGRAM

(Teaching Credential—Physical Science)

Principles of Geology	GSC	111	(3)
Historical Geology	GSC	112	(3)
Principles of Geology Lab	GSC	141	(1)
Principles of Geology Field Trips	GSC	142	(1)
Historical Geology Lab	GSC	151	(1)
Geological Graphics	GSC	175	(2)
Mineralogy	GSC	215	(5)
Optical Mineralogy	GSC	325	(4)
Invertebrate Paleontology	GSC	331	(4)
Stratigraphy	GSC	332	(4)
Structural Geology	GSC	333	(4)
Sedimentary Petrology	GSC	423	(4)
Igneous & Met Petrology	GSC	424	(3)
Igneous & Met Petrography	GSC	425	(2)
Senior Thesis	GSC	461	(2)
Senior Thesis	GSC	462	(2)
Senior Seminar	GSC	463	(2)
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)
Elem Organic Chemistry	CHM	201	(3)
Elem Organic Chemistry Lab	CHM	250	(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)
Basic Biology	BIO	115	(5)
Pascal	CS	120	(4)
or Fortran	CS	125	
Analytic Geometry & Calculus	MAT	114	(3)
Analytic Geometry & Calculus	MAT	115	(3)
Analytic Geometry & Calculus	MAT	116	(4)
Basic Soil Science	SS	231	(4)
Introduction to Statistics	STA	120	(4)

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. Courses approved for CR/NC grading designated by (non-majors only).

Field Trip Fee is required of various courses to cover transportation costs and varies according to type of transportation used.

GSC 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, one recitation per week.

GSC 111 Principles of Geology (3) FWSp(Su)

Fundamental geologic processes, general surface features and the earth's interior, minerals, rocks and structures. 3 lectures. Corequisites: GSC 141, 142 optional for non-majors. Special field-taught sections offered spring quarter.

GSC 112 Historical Geology (3) WSp

Changes in continents and ocean basins, fossil populations during successive geological ages, 3 lectures. May be taken without lab by non-majors.

GSC 115 Astromony of the Solar System (3) FW

Introduction to the modern concepts of astromony, including the historical development of astronomy and the origin and evolution of the Solar System, with a special emphasis on recent discoveries about the planets. 3 lectures.

GSC 116 Astronomy of the Universe (4) Sp

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. 4 lecture-discussions.

GSC 117 Astronomy Laboratory (1)

Provides student with experience in use of planetary data sets. Lab exercises will include studies of planetary and lunar surfaces, planetary motion, tides, and atmospheres. 1 3-hour laboratory. Prerequisite or concurrent enrollment: GSC 115 or consent of instructor.

GSC 120 Introduction to Oceanography (4) 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. 4 lectures. Field trip fee required.

GSC 141 Principles of Geology Laboratory (1) FWSp(Su)

Classification of minerals and rocks. Reading and interpreting topographic and geologic maps. One 3-hour lab. Must be taken concurrently with GSC 111 or permission of instructor. Lab optional for non-majors.

GSC 142 Principles of Geology Field Trips (1)

Field trips to study features of geologic interest in Southern California. Two full-day Saturday field trips. Must be taken concurrently with GSC 111. Does not meet lab science requirement. Optional for non-majors. Field trip fee required.

GSC 151 Historical Geology Laboratory (1) WSp

Classification of fossil invertebrates, studies of paleogeographic maps and geologic maps and problems in structural geology. One 3-hour laboratory. Must be taken concurrently with GSC 112 or permission of instructor. Optional for non-majors. Field trips required. Field trip fee required.

GSC 175 Geological Graphics (2) Sp

Methods and practice in geological illustration with emphasis on structural and stratigraphic presentation. Two 3-hour laboratories. Prerequisite: GSC 111.

GSC 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.

GSC 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 lecture-problems, 2 three-hour laboratories. Prerequisites: GSC 111 (including lab). Concurrent: CHM 104 and 141, or CHM 111 and 151. Field trip fee required.

GSC 219 Hand Specimen Petrology (4)

Emphasis on rock collecting and field relationships. Rock identification based largely on megascopic properties. Students will be required to make field trips and field collections. 2 lecture-problems, 2 three-hour laboratories. Prerequisites: GSC 111 and GSC 141, and GSC 142. Field trip fee required.

GSC 250 Environmental Geology (4)

Application of geologic principles to selected environmental problems; topics include resources (water, minerals, and energy), geologic hazards (floods, earthquakes, and landslides), and environmental planning (waste disposal, construction siting, and environmental impact statements). 4 lectures. Field trips required. Field trip fee required.

GSC 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-problem solving, laboratory, or a combination of both.

GSC 300 Introduction to Geochemistry (4) F (even years)

The application of quantitative chemical principles to geologic processes. Emphasis is on low temperature aqueous geochemistry, isotope geochemistry and high temperature thermodynamics of silicate melts. Basic concepts of crystal chemistry, organic geochemistry and cosmic geochemistry are also introduced. 3 lecture-problems, 1 3-hour lab. Prerequisites: GSC 111 & 1 year college chemistry.

GSC 303 Climatology (4) Sp

Introduction to weather-producing processes, including Earth's heat budget, thermodynamics of the atmosphere, and the global distribution of climatic types. Modern theories of climatic change caused by orbital variations, carbon dioxide, and other factors; impact of climate on society. 4 lecture-problems presentations.

GSC 304 Meteorology (4) W

Framework topics, such as atmospheric structure, composition, global heat budget, pressure, and humidity form the base upon which a process-oriented, semiquantitative, descriptive survey of major weather phenomena, including winds, clouds, precipitation, and storms, is conducted. 4 lecture/problems. Prerequisites: PHY 121 or consent of instructor.

GSC 321 Geotechnology (4) FWSp

Fundamentals of geology applied to engineering problems. Includes rock types, structure, erosion, sedimentation, seismic explorations, and rock/soil movements. 3 lecture-problems, 1 three-hour laboratory. For Civil Engineering majors. Prerequisite: CE 134. Field trips required. Field trip fee required.

GSC 323 Geomorphology (4) W

Analysis of landscape-forming agents, especially the geomorphic work of rivers, glaciers, waves, and wind. Laboratory and field study of the processes and their resulting landforms. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: GSC 111. Field trips required. Field trip fee required.

GSC 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. 2 lecture-problems, 2 three-hour laboratories. Prerequisite: GSC 215, CHM 112 concurrently.

GSC 331 Invertebrate Paleontology (4) Sp

Morphology and evolution of fossil invertebrates. Includes discussion of ancient environments and changes in life forms with time. 3 lecture-problems, 1 three-hour laboratory. Field trips required. Prerequisite: GSC 112, and GSC 151. Field trip fee required.

GSC 332 Stratigraphy (4) Sp

Stratigraphic procedures, correlation, depositional environments, classification and origin of stratigraphic units. 3 lecture-problems, 1 three-hour laboratory. Field trips required. Prerequisites: GSC 111, GSC 141, GSC 142, GSC 112, GSC 151. Field trip fee required.

GSC 333 Structural Geology (4) F

Structural features and deformation of the earth's crust. Solution of geologic field problems. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: Trigonometry, GSC 175, GSC 111, GSC 141, GSC 142. Field trips required. Field trip fee required.

GSC 334 Exploration Geophysics (4) W (even years)

Geophysical techniques. Gravity, magnetic, electrical and seismic methods applied to the solution of geologic problems. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: GSC 111, GSC 141, GSC 142, PHY 132 or 122. Field trips required. Field trip fee required.

GSC 335 Descriptive Physical Oceanography (4) F

A survey of physical, chemical and geological oceanography. Emphasis centers on the major physical and chemical properties of sea water and such physical processes as ocean circulations, tides and waves. Ocean basin physiography, sedimentation and evolution are also discussed. 4 lecture-problems; cruise. Prerequisites: CHM 106 & PHY 121. Field trips required. Field trip fee required.

GSC 338 Coastal Processes (4) Sp (even years)

Geologic development of, and the hydrologic and geologic processes acting within beach, deltaic and estuarine environments. Field trip required. 4 lecture-problems. Prerequisites: GSC 111, GSC 120 or 335. Upper division standing. Field trips required. Field trip fee required.

GSC 340 Marine Geology (4) Sp (odd years)

The physiography, sedimentology, structure, origin and evolution of the ocean basins and continental margins. Facts, data, speculation derived from a variety of texts, journals, maps. 4 lecture-problems. Prerequisites: GSC 335 or 120, and GSC 111, upper division standing. Field trips required. Field trip fee required.

GSC 351 Petroleum Geology (4) W

Origin and occurrence of petroleum and related products. Study of the geologic structure and stratigraphy of major oil and gas fields. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: GSC 141 and GSC 151. Field trips required. Field trip fee required.

GSC 360 Groundwater Geology (4) W (even years)

Groundwater occurrence and movement. Role in hydrologic cycle and geologic processes. Groundwater resource evaluation, geotechnical problems, and contamination. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: GSC 111, GSC 141, MAT 105 or higher, PHY 121 or 131.

GSC 370 Planetary Geology (4) Sp

Geological study of the planetary bodies of the Solar System, including the planets and their moons, with emphasis on comparative study of the planets based on data from manned space missions, planetary landers, and interplanetary probes. 4 lecture-problems. Prerequisite: GSC 111.

GSC 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.

GSC 415 Engineering Geology (4) W (even years)

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. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: GSC 111, with lab, or GSC 321. Field trips required.

GSC 423 Sedimentary Petrology (4) F

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: GSC 325. Field trips required. Lab fee required.

GSC 424 Igneous and Metamorphic Petrology (3) Sp

Theory of the origin, classification, chemistry and mineralogy of igneous and metamorphic rocks. 3 lectures. Prerequisite GSC 325. Corequisite GSC 425.

GSC 425 Igneous and Metamorphic Petrography (2) Sp

Mineralogy, texture and description of igneous and metamorphic rocks with the petrographic microscope, mineral separation techniques and x-ray diffraction. Field trips. Prerequisite GSC 325. Corequisite GSC 424. 2 three-hour laboratories. Field trips required. Field trip fees required.

GSC 433 Igneous and Metamorphic Ore Deposits (4) W (even years)

Geology of ore deposits in igneous and metamorphic rocks, including fluid inclusion studies, ore microscopy, stable isotope geochemistry, wall rock alteration and ore deposit modeling. Laboratory examination of ore suites, polished sections and thin sections. Field trips to selected mine localities required. 3 lectures, one 3-hour laboratory. Prerequisite: GSC 424. Field trips required. Field trip fee required.

GSC 434 Sedimentary Ores and Industrial Minerals (4) W (odd years)

Geology of sedimentary ore deposits and industrial rocks and minerals. Emphasis on economic aspects of resource recovery, occurrence and exploitation of low value/large tonnage deposits and industrial markets. Laboratory examination of thin section and polished sections, exercises in economic evaluation of ore deposits. Field trips to local mine sites required. 3 lectures, one 3-hour laboratory. Prerequisite: GSC 423. Field trips required. Field trip fee required.

GSC 440 Exploration and Mining Geology (4) Sp (even years)

Geological applications to mineral exploration 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 ore bodies and reserves estimates, examination and evaluation of mineral deposits and mining geology. 3 lecture-problems. 1 three-hour laboratory. Prerequisites: GSC 333, GSC 444, GSC 433 plus senior or graduate standing. Field trips required. Field trip fee required.

GSC 441 Micropaleontology (4) F (odd years)

Morphology, classification, and evolution of major plant and animal microfossil groups with emphasis on the Foraminiferida. Use of microfossils in petroleum exploration and paleoenvironmental reconstruction. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: GSC 112, GSC 151, GSC 331 or permission of instructor.

GSC 444 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. Field trips required. 3 lecture-problems.

GSC 455 Field Methods (4) Sp (even years)

Techniques of recognizing, mapping, analyzing, and interpreting geologic structures and earth features. Surveying with plane table, alidade, Brunton compass and tape. 1 lecture-problem, 3 three-hour laboratories. Prerequisite: Consent of instructor and upper division status. Field trips required. Field trip fee required.

GSC 461, 462 Senior Thesis (2)

Independent research study into a geologic problem of scientific merit following standard scientific methodology. Topic selection, research techniques, data analysis and formal write up are done under close guidance and supervision of a GSC faculty research advisor. Successful completion of GSC 461, 462 requires submission of a formal, written report in appropriate scientific style. In certain cases, publication of research results in appropriate scientific journal or as an abstract may be accepted in lieu of report.

GSC 463 Senior Seminar (2)

A formal, oral presentation of senior thesis results. This presentation will be judged on clarity, organization, scientific merit, and the presentor's ability to discuss and to respond to faculty and student questioning in an effective and persuasive manner. Students should not enroll in GSC 463 until senior thesis is near completion.

GSC 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: GSC 455. Field trip fee required.

GSC 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.

MATHEMATICS

V. Merriline Smith, *Chair*

Charles Amelin
Bernard Banks
Sidney Birnbaum
Hasan Celik
Yu Chang
Tse-yee Chen
Theodore J. Cullen
Hsin Ya Fan
Carlos Ford-Livene
Dhanwant Singh Gill
Frank Glaser
Jack E. Hofer
Donald Hook
Larry D. Irwin
Judith Jacobs
Thomas M. King
Alan Krinik
Kei A. Lee
Harriet Lord
Daniel A. Marcus
Henryka Maslowski
Frank P. Mathur
William McIntosh
Jim McKinney
Judy McKinney
John C. Morgan, II
Claudia Pinter-Lucke
Alan Radnitz
Kamta Rai
Richard A. Robertson
Barbara Shabell
Carol Smith
J. Scott Sportsman

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 Master's degree graduate program.

The Mathematics Department recommends that each student use several free electives to develop depth in some discipline other than mathematics.

A B.S. waiver program for the single subject teaching credential in mathematics is offered. The program is designed to provide the teacher candidate preparation in the scope and content areas approved by the state. The areas are Algebra, Calculus, Geometry, Statistics, Probability, Computer Programming, History of Math, and Number Theory. The core courses in the major together with the courses listed under the Secondary Teaching Option meet the state requirements.

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)

Pascal	CS	120	(4)
or FORTRAN	CS	425	
Applied Probability Theory	STA	330	(4)
Applied Statistics	STA	331	(4)
Analytic Geometry and Calculus	MAT	115	(4)
Analytic Geometry and Calculus	MAT	116	(4)
Intro to Numerical Methods	MAT	201	(4)
Introduction to Linear Algebra	MAT	208	(4)
Calculus of Several Variables	MAT	214	(3)
Calculus of Several Variables	MAT	215	(3)
Differential Equations	MAT	216	(4)
Basic Set Theory and Logic	MAT	310	(4)
Intermediate Analysis	MAT	314	(4)
Intermediate Analysis	MAT	315	(4)
Modern Algebra	MAT	417	(4)
Math, Stat Electives (300–400 level)			(16)

*A 2.0 cumulative GPA is required in core courses including option courses fot the major in order to receive a degree in this major.

OPTION COURSES FOR MAJOR *

(Required for specific option)

PURE MATHEMATICS

Choose one course from:

Topology	MAT	321	(4)
Differential Geometry	MAT	420	(4)

Complete all the following courses:

Advanced Calculus	MAT	413	(4)
Modern Algebra	MAT	418	(4)
Abstract Linear Algebra	MAT	419	(4)
Complex Variables	MAT	428	(4)
Foundations of Mathematics	MAT	450	(4)

APPLIED MATHEMATICS

The student must complete two two-quarter sequences from the list below:

Mathematics of Operations Research	MAT	380	(4)
Mathematics of Operations Research	MAT	381	(4)
Numerical Analysis	MAT	401	(4)
Numerical Analysis	MAT	402	(4)
Differential Equations	MAT	431	(4)
Differential Equations	MAT	432	(4)
Math. Modeling and Simulation	MAT	485	(4)
Math. Modeling and Simulation	MAT	486	(4)

The student must complete two additional courses from the list above or the list below:

Graph Theory	MAT	370	(4)
Mathematics of Operations Research	MAT	382	(4)

Combinatorics	MAT	470	(4)
Mathematical Programming	MAT	480	(4)

SECONDARY TEACHING

History of Mathematics	MAT	306	(4)
Introduction to Topology	MAT	321	(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

Choose 16 units from the following:

Nonparametric Statistics	STA	320	(4)
Applied Regression	STA	332	(4)
Stochastic Processes	STA	430	(4)
ANOVA and Design of Experiments	STA	435	(4)
Mathematical Statistics I	STA	440	(4)
Mathematical Statistics II	STA	441	(4)
Special Topics	STA	499	(1–4)
Computer Simulation	CS	390	(4)

Choose 8 units in consultation with your advisor.

SUPPORT AND ELECTIVE COURSES

(Required of all students)

General Chemistry	CHM	112	(3)
General Chemistry Lab	CHM	152	(1)
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)
Unrestricted Electives			(19)

GENERAL EDUCATION REQUIREMENTS

Category I
Choose one pattern

Category II
A. MAT 114 Analytical Geometry and Calculus
B. CHM 111 General Chemistry
CHM 151 General Chemistry Lab
PHY 131 General Physics
C. BIO 110 Life Science
D. Choose in consultation with advisor

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 course. Minimum 4

Category VI
Select one course from each area. Minimum total 8

Category VII
Upper Division—minimum 8
An additional 4 unit course must be taken.

MINOR IN MATHEMATICS

Analytic Geometry and Calculus	MAT	114	(4)
Analytic Geometry and Calculus	MAT	115	(4)
Analytic Geometry and Calculus	MAT	116	(4)
Calculus of Several Variables	MAT	214	(3)
Calculus of Several Variables	MAT	215	(3)
Differential Equations	MAT	216	(4)
Introduction to Linear Algebra	MAT	208	(4)

Any four upper division courses (except MAT 400, 461, 462, 463, 491, 492, STA 309, 315). No more than two upper division STA courses can be counted towards the Mathematics Minor (see Statistics Minor). No more than one of MAT 317 or MAT 318 can be counted towards the mathematics minor.

Minimum number of units required: (41)

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	(4)
Analytic Geometry and Calculus	MAT	115	(4)
Analytic Geometry and Calculus	MAT	116	(4)
Introduction to Linear Algebra	MAT	208	(4)
Calculus of Several Variables	MAT	214	(3)
Calculus of Several Variables	MAT	215	(3)
Applied Probability Theory	STA	330	(4)
Applied Statistics	STA	331	(4)
Applied Regression	STA	332	(4)

Choose 8 units from the following:

Nonparametric Statistics	STA	320	(4)
Stochastic Processes	STA	430	(4)
ANOVA and design of Experiments	STA	435	(4)
Mathematical Statistics I	STA	440	(4)
Mathematical Statistics II	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.

MATHEMATICS DIAGNOSTIC TEST (MDT)

A satisfactory mathematics Diagnostic Test score is required as a PREREQUISITE for all introductory General Education mathematics and statistics courses. THESE TESTS MUST BE TAKEN WITHIN THE IMMEDIATE-TWO QUARTERS PRIOR TO ENROLLMENT IN THE MATHEMATICS OR STATISTICS COURSE. There are three tests: Basic Algebra (for MAT 010, 011, 012); Intermediate Algebra (for MAT 105, 106, 125, 135, 205, STA 120); and Precalculus (for MAT 114, 130). All test results include cutoff scores for lower level courses. Tests are given each quarter, including summer quarter. Students must register in advance at the Mathematics Diagnostic Test desk (Bldg. 8, Room 108).

PREPARATORY MATHEMATICS PROGRAM

A four-quarter sequence of courses is provided for students needing intensive mathematics review in order to enroll in General Education mathematics or statistics courses. All courses include weekly tutorial-laboratories. Courses receive unit load credit but not baccalaureate credit. Students must have achieved prerequisite scores on

ELM or MDT in order to enroll in MAT 010, 011, 012. A grade of C or better in MAT 010 will waive the MDT requirement for MAT 011. A grade of C or better in MAT 011 will waive the MDT requirement for MAT 012, 205. A grade of C or better in MAT 012 will waive the MDT requirement for MAT 105, 106, 125, 135, 205, STA 120. A waiver of any MDT requirement is valid for two (2) quarters only.

Course Descriptions

F, W, Sp, Su notations indicate the quarter(s) each course is normally offered. Unless otherwise specified, the course is offered this year during the indicated quarter(s).

Students subject to the CSU system required Entry Level Mathematics test (ELM) are required to pass ELM prior to enrolling in any General Education approved math course. Any course listed as a prerequisite must be passed with a C, or better grade. In addition all GE level mathematics courses require a passing score on the appropriate Diagnostic Test as a prerequisite for enrollment.

MAT 009 Introductory Mathematics (4) FWSpSu

Review of arithmetic with applications, measurement systems, introductory statistics, operations with integers. 4 lecture-problems. Two-hour tutorial laboratory. Letter grade only.

MAT 010 Prealgebra (4) FWSpSU

Geometry, measurement geometry, introduction to algebra including variable expressions, linear equations, polynomials, techniques of factoring, integer exponents. 4 lecture-problems. Two-hour tutorial laboratory. Letter grade only. Prerequisite: Minimum score of 360 on ELM, or current passing score on appropriate MDT or C or better in MAT 009 within two quarters.

MAT 011 Basic Algebra (4) FWSpSu

Applications of linear equations, techniques of factoring, rational expressions, linear inequalities, graphs of linear functions, systems of linear equations, rational exponents and radicals, quadratic equations. 4 lecture-problems. Two-hour tutorial laboratory. Letter grade only. Prerequisite: Minimum score of 480 on ELM, or current passing score on appropriate MDT or C or better in MAT 010 within two (2) quarters.

MAT 012 Intermediate Algebra (4) FWSpSu

Complex numbers, advanced quadratic equations with applications, quadratic and rational inequalities, functions, conic sections, logarithms, non-linear systems of equations, sequences and series, binomial expansions. 4 lecture-problems. One-hour tutorial laboratory. Letter grade only. Prerequisite: Current passing score on appropriate MDT or C or better in MAT 011 within two (2) quarters.

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-problems. Prerequisite: Passing score on ELM and current passing score on the appropriate Math Diagnostic Test or C or better in MAT 012 within two quarters.

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-problems. Prerequisite: Passing score on ELM and current passing score on the appropriate Math Diagnostic Test or C or better in MAT 012 within two quarters.

MAT 114 Analytic Geometry and Calculus I (4) FWSpSu

Functions, limits and continuity. Derivatives and applications of Derivatives including max/min applications, L'Hospital's Rule. Introduction to Integration, the Fundamental Theorem of Calculus, the Indefinite Integral. 4 lecture-problems. Prerequisite: Passing score on ELM and a current passing score on the appropriate Math Diagnostic Test and C or better in MAT 105 and MAT 106 or equivalent.

MAT 115 Analytic Geometry and Calculus II (4) FWSpSu

Applications of the Definite Integral, Calculus of Inverse Functions including trig functions, log and exponential functions, and hyperbolic functions. Integration techniques including substitution, parts, products of trig functions, partial fractions, trig substitution, quadratic forms, improper integrals. 4 lecture-problems. Prerequisite: C or better in MAT 114 or consent of the instructor.

MAT 116 Analytic Geometry and Calculus III (4) FWSpSu

Sequences and Series, Polar Coordinates, Parametric equations and Conic Sections. Introduction to Vectors, dot products, equations of lines and planes. 4 lecture-problems. Prerequisites: C or better in MAT 115 or consent of the 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-problems. Prerequisite: Passing score on ELM and current passing score on the appropriate Math Diagnostic Test or C or better in MAT 012 within two quarters.

MAT 130 Technical Calculus I (4)

Differential calculus of rational functions and applications of the derivative. Integral calculus and applications of the integral. 4 lecture-problems. Prerequisite: C or better in MAT 105 and current passing score on the appropriate math diagnostic exam and ELM.

MAT 131 Technical Calculus II (4)

Analytic geometry. Derivatives and integrals of trigonometric, logarithmic, and exponential functions and applications. 4 lecture-problems. Prerequisite: C or better in MAT 106 and MAT 130 or consent of instructor.

MAT 132 Technical Calculus III (4)

Techniques of multidimensional calculus, infinite series, introduction to ordinary differential equations, and Laplace transforms. 4 lecture-problems. Prerequisite: C or better in MAT 131 or consent of instructor.

MAT 135 Contemporary Mathematics (4)

Emphasis on modern applications of selected topics from linear equations and inequalities, introduction to matrices, graphs, linear programming, sets and counting techniques, probability, decision theory, markov chains, games, logic, mathematics of finance, trees and algorithms. 4 lecture-problems. Prerequisite: Passing score on ELM and two years of high school algebra and current passing score on the appropriate math diagnostic test or C or better in MAT 012 within two quarters.

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 201 Introduction to Numerical Methods (4)

Numerical methods of topics from algebra and calculus. Topics will include function evaluation and graphing, limits, summation, solving nonlinear equations, systems of equations, numerical integration and differentiation, and an introduction to numerical error. 4 lecture-problems. Prerequisite: C or better in MAT 116 and CS 120 or CS 125 or consent of instructor.

MAT 205 Basic Concepts of Elementary Mathematics (4)

Concepts of logic and set theory; development of the real number system through the integers; development of numeration systems; elementary concepts of algebra; introduction to number theory. Development of problem solving strategies and applications of computers to these topics. 4 lecture-problems. Prerequisite: Passing score on ELM and current passing score on the appropriate MDT or C or better in MAT 011, within two quarters. Not open to mathematics majors for mathematics elective credit.

MAT 206 Concepts of Elementary Mathematics (4)

Development of the real number system through the rationals and reals; introduction to elementary concepts of probability and statistics. Problem solving and application of computers to these topics. 4 lecture-problems. Prerequisite: C or better in MAT 205. Not open to mathematics majors for mathematics elective credit.

MAT 207 Basic Concepts of Geometry I (4)

Introduction to metric and non-metric geometry; development of inductive and deductive geometric proofs; programming in LOGO. 4 lecture-problems. Prerequisite: C or better in MAT 206. Not open to math majors for mathematics elective credit.

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 lecture-problems. Prerequisite: C or better in MAT 214, or consent of instructor.

MAT 214 Calculus of Several Variables I (3) FWSpSu

Calculus of Vector Valued Functions including unit tangents,unit normals, and curvature. Introduction to multivariable functions, the Differential Calculus of Multivariable Functions, the chain rule, applications including extreme problems and Lagrange multipliers. 3 lecture-problems. Prerequisite: C or better in MAT 116 or consent of instructor.

MAT 215 Calculus of Several Variables II (3) FWSpSu

Integral Calculus of Multivariable functions, double and triple Integrals, applications of double and triple integrals, line and surface integrals, Green's Theorem, Divergence Theorem, Stokes Theorem. 3 lecture-problems. Prerequisite: 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-problems. Prerequisite: C or better in 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) F, (even years)

Development of mathematics over four millennia. Recommended for students preparing to teach mathematics. 4 lectures. Prerequisite: C or better in MAT 215, or consent of instructor.

MAT 310 Basic Set Theory and Logic (4) FSp

Basic set theory and logic, relations, functions, mathematical induction, countable and uncountable sets. Emphasis on how to present and understand mathematical proof. 4 lecture-problems. Prerequisite: C or better in 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, differentiation, integration, introduction to function spaces. 4 lecture-problems. Prerequisite for MAT 314: C or better in MAT 215 and MAT 310 or consent of instructor. Prerequisite for MAT 315: C or better in MAT 314, or consent of instructor.

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 lecture-problems. Prerequisite: C or better in MAT 216, or consent of instructor.

MAT 318 Mathematical Analysis of Engineering Problems (3) FSpSu

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 lecture-problems. Prerequisite: C or better in MAT 215, or consent of instructor.

MAT 321 Introduction to Topology (4) W (odd years)

Topology of the line and plane, topological spaces, continuity and topological 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 lecture-problems. Prerequisite: C or better in MAT 310, or consent of instructor.

MAT 325 Introduction to the Theory of Numbers (4) Sp (odd years)

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 lecture-problems. Prerequisite: Junior standing or consent of instructor.

MAT 330 Modern Euclidean Geometry (4) F (odd years)

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. 4 lecture-problems. Prerequisite: Consent of instructor.

MAT 370 Graph Theory (4) W

The study of graphs, trees, Eulerian, Hamiltonian, planar graphs, connectivity, coloring, independence and covering numbers, directed graphs, theorems of Menger, Ramsey with applications. 4 lecture-problems. 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. 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. 4 lecture-problems. Prerequisites: C or better in MAT 208, and 215, or consent of instructor.

MAT 381 Mathematics of Operations Research (4) W

Solution of transportation, transshipment and assignment problems. 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. 4 lecture-problems. Prerequisite: C or better in MAT 380, or consent of instructor.

MAT 382 Mathematics of Operations Research (4) Sp

Introduction to Markov queuing 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. 4 lecture-problems. Prerequisites: C or better in MAT 208, MAT 215 and STA 330 or 309 or 315, 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 Numerical Analysis (4) F

Theoretical error and machine error associated with algorithms. Solutions of non-linear equations, systems of linear equations and systems of non-linear equations. Polynomial interpolation and cubic splines. 4 lecture-problems. Prerequisite: C or better in MAT 201, MAT 208 and MAT 215 and a knowledge of Fortran or Pascal or consent of instructor.

MAT 402 Numerical Methods in Differential Equations (4) W

Numerical differentiation and integration, initial value problems, boundary value problems, approximation theory. 4 lecture-problems. Prerequisite: C or better in Mat 216 and Mat 401 or CS 301 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 lecture-problems. Prerequisite: C or better in MAT 315, or consent of instructor.

MAT 415 Foundations of Geometry (4) W (even years)

Axiomatic development of selected topics from euclidean and neutral geometries; introduction to non-euclidean geometry with emphasis on the hyperbolic case. 4 lecture-problems. Prerequisite: C or better in MAT 208 and 215, or consent of instructor.

MAT 416 Projective Geometry (4) Sp (even years)

Synthetic and analytic treatment of selected topics from projective geometry; classical theorems, conics, polarities; quadratic and bilinear forms. 4 lecture-problems. Prerequisite: C or better in 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 lecture-problems. Prerequisite for MAT 417: C or better in MAT 310 or consent of instructor. Prerequisite for MAT 418: C or better in MAT 417 or consent of instructor.

MAT 419 Abstract Linear Algebra (4)

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 lecture-problems. Prerequisite: C or better in MAT 208, or consent of instructor.

MAT 420 Differential Geometry (4)

The Frenet formulas, covariant derivatives, frame fields, the structure equations, differential forms on a surface, normal curvature, Gaussian curvatures; intrinsic geometry of surfaces in E3, the Gauss and Bonnet theorem. 4 lectures-problems. Prerequisite: C or better in MAT 314 and MAT 216, or consent of instructor.

MAT 428, 429 Functions of a Complex Variable (4) (4) WSp (even years)

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-problems. Prerequisites for MAT 428: C or better in 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) WSp (odd years)

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 lecture-problems. Prerequisite: C or better in MAT 216 and 208 or consent of instructor.

MAT 444 Vector and Tensor Analysis (4) F (even years)

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 lecture-problems. Prerequisite: C or better in MAT 208 and 216. PHY 321 is recommended, or consent of instructor.

MAT 450 Foundations of Mathematics (4)

Introduction to axiom systems including consistency, independence, satisfiability, and completeness; transfinite arithmetic; the continuum hypothesis; well ordering and its equivalents. 4 lecture-problems. Prerequisite: C or better in MAT 310 or consent of the 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 470 Combinatorics (4) Sp (odd years)

Study of enumeration techniques, permutations, combinations, principle of inclusion and exclusion, finite fields, combinatorial designs, error-correcting codes. 4 lecture-problems. Prerequisite: C or better in Mat 208 or consent of instructor.

MAT 480 Mathematical Programming (4) Sp

Treatment of linear inequalities, duality, general algorithms, application of linear programming. Introduction to discrete and nonlinear programming. 4 lecture-problems. Prerequisite: C or better in MAT 208 and CS 125, or 120, or consent of instructor.

MAT 485, 486 Mathematical Modeling and Simulation (4) (4)

Introduction to the general principles of modeling. Models will be selected from the areas such as physics, biology, political science, chemistry, engineering, and business. Analytical, numerical, and simulation methods will be used to solve the models. 4 lecture-problems. Prerequisites: C or better in the following courses: CS 120 or CS 125, MAT 201, MAT 208, MAT 216, and STA 330 or consent of instructor.

MAT 491 Basic Concepts of Geometry II (4)

Introduction to congruence and similarity through constructions and deductive proofs; motion geometry involving translations, rotations, and flips; tesselations; topology; coordinate geometry. 4 lecture-problems. Prerequisite: C or better in MAT 207. Not open to math majors for upper division mathematics elective credit.

MAT 492 Computer Application in Mathematics (4)

Use of the microcomputer in teaching and learning mathematics. Evaluation and utilization of instructional software; use of application software including database and spreadsheets; social issues related to microcomputer use. 4 lecture-problems. Prerequisite: C or better in MAT 491 or permission of the instructor. Not open to math majors for upper division mathematics elective credit.

MAT 493 Algebraic Structures and Computing for Elementary and Middle School Teachers (4)

Development of algebraic structures from groups to fields. Study of modular arithmetic, relationships and functions. Use of the computer, including programming in BASIC, to investigate algebraic relationships and algorithms. 4 lecture-problems. Prerequisite: C or better in MAT 491 or permission of the instructor. Not open to math majors for upper division mathematics elective credit.

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

Alan Krinik, *Coordinator*

STA 120 Statistics with Applications (4)

Collection and summarization of data; measures of central tendency and dispersion; probability; binomial and normal distributions, confidence intervals and hypothesis testing. Not open to mathematics or engineering majors. 4 lecture-problems. Prerequisites: Passing score on ELM and current passing score on appropriate math diagnostic test or C or better in MAT 012 within two quarters.

STA 210 Statistical Computing (4)

Use of computer packages, inferences about means of two populations, dependent and independent samples, small and large samples, inferences about proportions and variances, correlation and regression. 4 lecture-problems. Prerequisite: C or better in STA 120 or consent of instructor.

STA 220 Discrete Probability Models (4)

Set-theoretic approach to probability in finite sample spaces. Conditional probability, independence, binomial, hypergeometric and related distributions. 4 lecture-problems. Prerequisite: C or better in MAT 105, or consent of instructor.

STA 309 Statistical Methods in Engineering and the Physical Sciences (3) FWSpSu

The uses of statistics in testing, inspection and production, measures of central tendency and dispersion, probability, binomial and normal distributions, sampling theory, hypothesis testing and estimation, comparison of two populations. Not open to students required to take STA 315 or ECE 315. 3 lecture-problems. Prerequisite: C or better in MAT 214 or consent of instructor.

STA 310 Sampling Survey Methods (4)

Simple random sampling, stratified, cluster, systematic, multistage, multiphase and probability sampling methods, source of errors, sample size estimation. 4 lecture-problems. Prerequisite: C or better in STA 120 or equivalent or consent of instructor.

STA 315 Probability and Statistics for Engineers (4) FWSpSu

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 lecture-problems. Prerequisite: C or better in MAT 215, or consent of instructor. Not open to students with credit in ECE 315, STA 309 or students required to take STA 330.

STA 320 Nonparametric Statistics (4) S (odd years)

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-problems. Prerequisite: C or better in STA 210 or STA 331, or consent of instructor.

STA 330 Applied Probability Theory (4) FW

Rules of probability, random variables, expected values of random variables, moment generating functions. Discrete and continuous probability distributions, including bivariate distributions, with applications. 4 lecture-problems. Prerequisite: C or better in MAT 215. Not open to students with credit in STA 315 or ECE 315.

STA 331 Applied Statistics (4) WSp

Central limit theorem, maximum likelihood estimation. Point and interval estimation and hypothesis testing. Small and large sample inferences. Contingency table analysis and Chi-square tests. 4 lecture-problems. Prerequisite: C or better in STA 330, STA 315, ECE 315, or consent of instructor.

STA 332 Applied Regression (4) Sp (even years)

Least squares estimation, linear models, correlation, multiple regression, transformations of variables. Use of MINITAB, and other computer packages for applied problems. 4 lecture-problems. Prerequisite: C or better in STA 331 and MAT 208 or consent of instructor.

STA 430 Introduction to Random Processes (4) W (odd years)

General types of stochastic processes. Random walks, Poisson processes, counting processes, Markov chains, and topics from other areas such as Markov jump processes, Birth-death processes, Gaussian processes. 4 lecture-problems. Prerequisite: C or better in STA 315 or STA 330 or consent of instructor.

STA 435 Analysis of Variance and Design of Experiments (4) F (even years)

ANOVA techniques, computer solutions, randomized groups and blocks designs, interactions, analysis of covariance. Latin square, split-plot, simple and confounded factorial designs; treatment of missing data, incomplete block designs. 4 lecture-problems. Prerequisite: C or better in STA 331 or STA 441 or consent of instructor.

STA 440 Mathematical Statistics I (4) F (odd years)

Discrete and continuous probability distributions; moments, moment generating functions, special distributions, distributions of functions of random variables. 4 lecture-problems. Prerequisite: C or better in MAT 215, or consent of instructor.

STA 441 Mathematical Statistics II (4) W (even years)

Asymptotic distributions; central limit theorem; point and interval estimation; completeness and sufficient statistics; Neyman-Pearson theory of testing hypotheses. 4 lecture-problems. 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.

Edward K. Mercer, *Chair*

James O. Jackson, *Coordinator*

Jill P. Adler
John K. Chan
Brigitte H. Goehler
Larry K. McKane
Bijay K. Pal
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.

Environmental Health Specialist Minor

The Environmental Health Sanitarian Minor is an interdisciplinary program which may be pursued by majors in any field. Its purpose is to prepare students for careers as Environmental Health Sanitarians by meeting the standards for the state internship program. State employed sanitarians are specialists who enforce and administer laws governing water, food, and air contamination, noise, land use planning, occupational health hazards, and animal vectors of disease. The minor is particularly suitable for students majoring in Microbiology.

A full description of the minor is located in the "University Programs" section of this catalog.

PHYSIOLOGY MINOR

The Physiology Minor is an interdisciplinary program which can be elected by students majoring in any field. Its purpose is to improve the training and advising of students in order to facilitate their pursuit of careers in biomedical fields utilizing a knowledge of physiology. It is particularly appropriate for students majoring in Microbiology.

A full description of the minor is located in the "University Programs" section of this catalog.

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

Cellular Physiology	BIO	435	(4)
Concepts of Molecular Biology	BIO	450	(4)
Plant Structures and Functions	BOT	124	(5)
Applied Microbiology	MIC	310	(5)

*A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Approved electives to be chosen in consultation with advisor ** ..... (1–12)

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 include BIO 299, 310, 410, 411, 423, 431, 435, 441, 461, 462, BOT 425, 426, CHM 301, 311, 318, CS 101, MAT 115, 116, MIC 200, 310, 330, 400, 422, MHR 301, ZOO 422, 435, plus any course in advanced Chemistry and any 500-level Biology class for which the student is qualified. Undergraduates must petition to take 500-level courses.

SUPPORT AND ELECTIVE COURSES

(Required of all students)

College Chemistry	CHM	105	(3)
College Chemistry	CHM	106	(3)
College Chemistry Lab	CHM	142	(1)
College Chemistry Lab	CHM	143	(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)

Biochemistry	CHM	327	(4)
Biochemistry	CHM	328	(4)
Biochemistry	CHM	329	(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 (p. 441).

GENERAL EDUCATION REQUIREMENTS

Category I:

A. Freshman English I	ENG	104	(4)
B. Advocacy and Argument	SP	204	(4)
C. Freshman English II	ENG	105	(4)

Category II:

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. Environmental Conservation	BIO	201	(3)
(OR) Principles of Evolution	BIO	213	(4)
(OR) Intro to Marine Biology	BIO	220	(4)

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:
BIO 205, CPU 201, CPU 202 *or* PSY 201 ..... (4)

Category VI:
Select one course from each group.
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	
Medical Bacteriology	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 (4) FWSp

Microorganisms and man's existence. Elements of microbiology and applications to daily life. For nonbiological science majors. 4 lecture-discussions. *Chan, 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

A study of morphology, metabolism, classification, and cultivation of bacteria with emphasis on problem solving, identification, and growth of microbes. The role of microbes in disease processes and concepts of immunity and resistance are discussed. 3 lectures, 2 three-hour laboratories. Prerequisite: BIO 110 or 115; CHM 104, 141 or CHM 111, 151. *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-problem, laboratory, or a combination of both. *Staff*

MIC 300 Microbial Structures and Functions (5) FW

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 lecture-problems, 2 three-hour laboratories. Prerequisite: MIC 201, CHM 201, and 250 or 314, 315 and 317. *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 lecture-problems. 2 three-hour laboratories. Prerequisite: MIC 201, CHM 201, and 250 or 314, 315, and 317. *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 lecture-problems, 2 three-hour laboratories. Prerequisites: MIC 201, CHM 201 and 250. *Goehler*

MIC 330 General Epidemiology (4) W

Fundamental concepts in the study of disease occurrence in human populations. Emphasis on descriptive epidemiology, formulation of hypotheses, and analytic epidemiology, and case studies with problem solving. 4 lecture-problems. Prerequisites: MIC 201, STA 120. *Chan*

MIC 400 Special Problems for Upper Division Students (1–2) FWSpSu (Also BIO, BOT or ZOO 400)

Individual or group investigation of selected problems or supervised attendance for juniors and seniors at department seminars. Discussions and reports required. Enrollment requires: 1) Prior arrangement with a faculty member. 2) Completion of a supervisory form available from 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 lecture-problems, 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 lecture-problems, 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 lecture-problems, 2 three-hour laboratories. Prerequisite: CHM 328, ZOO 235. *Staff*

MIC 425 Medical Mycology (5) W

Characteristics, habitats and laboratory identification of fungi inciting human and animal diseases. 3 lecture-problems, 2 three-hour laboratories. Prerequisite: 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 lecture-problems, 2 three-hour laboratories. Prerequisite: MIC 300. *Pal*

MIC 444 Hematology (4) FSp

The anatomy, physiology, and pathology of the normal hematopoietic system; frequently encountered blood dyscrasias related to human red blood cells. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ZOO 138 or permision of instruction. *Chan.*

MIC 445 Immunohematology (4) WSp

General characteristics of human blood group antigens; antigen-antibody reactions related to human red blood cells and human diseases. 3 lecture-problems and one three-hour laboratory. Prerequisite: MIC 415 or permission of instructor. *Chan.*

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-problems, laboratory, or a combination of both. *Staff*

PHYSICS

Harvey S. Leff, *Chair*
Antonio Aurilia
Robert T. Bush
Soumya Chakravarti
Barry H. Dorfman
Robert D. Eagleton
John Fang
John W. Jewett
Kai-Shue Lam
Steven W. McCauley
Mary E. Mogge
Roger L. Morehouse
Barton Palatnick
George W. Rainey
Peter B. Siegel
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, health physics, geophysics, physical chemistry, engineering or mathematics.

Physics majors enjoy relatively small upper division classes spanning experimental and theoretical aspects of classical and modern physics. They each do a senior project under faculty supervision. Additionally, they are encouraged to participate in other independent or group study/research activities sponsored by individual faculty.

Students majoring in physics have the opportunity to join the honorary society, Sigma Pi Sigma. Additional information concerning membership can be obtained from the Physics Department.

For those planning a career as a secondary school teacher, a single subject credential in Physical Science is required. This credential is obtained by completing coursework in Education and passing the National Teacher Examination. The latter can be waived by taking the courses listed in the Waiver Program. See the department chairperson for additional information.

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 Lab	PHY	151	(1)
General Physics Lab	PHY	152	(1)
General Physics Lab	PHY	153	(1)
General Physics	PHY	234	(3)
Elem Modern Physics	PHY	235	(3)
General Physics Lab	PHY	254	(1)
Elem Modern Physics Lab	PHY	255	(1)
Fund of Math Phy	PHY	308	(4)
Fund of Math Phy	PHY	309	(4)
Physics of Elec & Mag	PHY	314	(4)
Physics of Elec & Mag	PHY	315	(4)
Mechanics	PHY	321	(4)
Mechanics	PHY	322	(4)
Thermal Physics	PHY	333	(4)
Quantum Mechanics	PHY	401	(4)
Quantum Mechanics	PHY	402	(4)
Optics	PHY	417	(3)
Optics Lab	PHY	418	(1)
Advanced Physics Lab	PHY	430	(1)
Solid State Physics Lab	PHY	431	(1)
Nuclear Physics Lab	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)

General Chemistry	CHM	112	(3)
General Chemistry	CHM	113	(3)
General Chemistry Lab	CHM	152	(1)
General Chemistry Lab	CHM	153	(1)
Pascal	CS	120	(4)
or-FORTRAN	CS	125	(4)
Anal Geom. & Calc	MAT	115	(4)
Anal Geom. & Calc	MAT	116	(4)
Calc of Sev Variables	MAT	214	(3)
Calc of Sev Variables	MAT	215	(3)
Diff. Equations	MAT	216	(4)
Advanced Electives			(12)
(To be chosen from upper division courses in Physics or related fields in consultation with advisor; at least 4 units of these must be in Physics.)			
Free Electives			(15)

GENERAL EDUCATION REQUIREMENTS

Category I (Pattern 2 recommended)

A. Freshman English I	ENG	104	(4)
B. **Advocacy and Argument	COM	204	(4)
C. **Report Writing	COM	216	(4)

Category II

A. Analytic Geom. & Calculus	MAT	114	(4)
B. General Chemistry	CHM	111	(3)
and General Chemistry Lab	CHM	151	(1)
C. Life Science	BIO	110	(3)
and Life Science Lab	BIO	111	(1)
or Basic Biology	BIO	115	

D. Select one course in consultation with advisor ..... (4)

Category III

Select one course from each area. Minimum total (12)

Category IV

A. Select one course from this area ..... (4)
B. Select one course from this area ..... (4)
C. The Scientific Revolution ..... HST 421 (4)

*A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

** Recommended Choice.

Category V
Select one course ..... (4)

Category VI

American Civilization	AMC	201	(4)
or Intro to American Government	PLS	201	
American Civilization	AMC	202	(4)
or U.S. History	HST	202	

Category VII
Select two courses from:

History of Physics	PHY	306	(4)
History and Philosophy of Chemistry	CHM	306	(4)
History of Mathematics	MAT	306	(4)

for a total of 8 units.

PHYSICS MINOR

College Physics	PHY	121/141	(4)
and College Physics	PHY	122/142	(4)
and College Physics	PHY	123/143	(4)
or			
General Physics	PHY	131/151	(4)
and General Physics	PHY	132/152	(4)
and General Physics	PHY	133/153	(4)
and General Physics	PHY	234	(3)
and Elem Modern Physics	PHY	235	(3)

A min. of 30 units in physics, including the above, must be taken, of which at least 12 units must be chosen from upper division courses and no more than 12 units may be at the 100-level. ..... (30)

WAIVER PROGRAM

(Teaching Credential—Physical Science)

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 Physics	PHY	234	(3)
Elementary Modern Physics	PHY	235	(3)
General Physics Lab	PHY	254	(1)
Elementary Modern Physics Lab	PHY	255	(1)
Electronics for Scientists	PHY	304	(4)
Fund of Math Physics	PHY	308	(4)
Fund of Math Physics	PHY	309	(4)
Physics of Electric & Magnetic Phenomena	PHY	314	(4)
Physics of Electric & Magnetic Phenomena	PHY	315	(4)
Mechanics	PHY	321	(4)
Mechanics	PHY	322	(4)
Thermal Physics	PHY	333	(4)
Quantum Mechanics	PHY	401	(4)
Quantum Mechanics	PHY	402	(4)
Optics	PHY	417	(3)
Optics Lab	PHY	418	(1)
Special Problems in Experimental Physics	PHY	430	(1)
Special Problems in Experimental Physics	PHY	431	(1)
Special Problems in Experimental Physics	PHY	432	(1)
Senior Project	PHY	461	(2)
Senior Project	PHY	462	(2)
Undergraduate Seminar	PHY	463	(2)
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)
Principles of Geology	GSC	111	(3)
Historical Geology	GSC	112	(3)
Principles of Geology Lab	GSC	141	(1)
Principles of Geology Field Trips	GSC	142	(1)
Historical Geology Lab	GSC	151	(1)
Life Science	BIO	110	(3)
or Basic Biology	BIO	115	
Pascal	CS	120	(4)
or FORTRAN	CS	125	
Analytic Geometry & Calculus	MAT	114	(4)
Analytic Geometry & Calculus	MAT	115	(4)
Analytic Geometry & Calculus	MAT	116	(4)
Calculus of Several Variables	MAT	214	(3)
Calculus of Several Variables	MAT	215	(3)
Differential Equations	MAT	216	(4)
History of the Scientific Revolution	HST	351	(4)

Two of the following:

History of Physics	PHY	306	(4)
History of Chemistry	CHM	306	(4)
History of Mathematics	MAT	306	(4)

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.

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. May be graded on CR/NC basis.

PHY 105 Physics of Musical Sound (4) Sp

The fundamentals of acoustics and its application to music—vibrations, wave, hearing, pure tones, complex tones, resonance, scales, consonance, and the physics of musical instruments. 3 lecture-problems, 1 three-hour laboratory.

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 lecture-problems. Not for students majoring in physics or engineering. Prerequisite: MAT 106 or equivalent. Corequisite: PHY 141.

PHY 122 College Physics (3) FWSpSu

Heat, wave motion, sound, light and optical devices. 3 lecture-problems. Prerequisite: PHY 121 and PHY 141. Corequisite: PHY 142.

PHY 123 College Physics (3) FWSpSu

Electricity and magnetism, DC and AC circuits, electronics, atomic and nuclear physics. 3 lecture-problems. Prerequisite: PHY 122 and PHY 142. Corequisite: PHY 143.

PHY 131 General Physics (3) FWSpSu

Fundamental principles of mechanics, vectors, statics, uniform motion, accelerated motion, work and energy, rotational motion, and fluid mechanics. 3 lecture-problems. Prerequisites: MAT 114. Corequisite: MAT 115 and PHY 151.

PHY 132 General Physics (3) FWSpSu

Fundamental principles of harmonic motion, waves, rotational dynamics, thermodynamics, kinetic theory, and optics. 3 lecture-problems. Prerequisites: PHY 131 and 151. Corequisites: MAT 116 and PHY 152.

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 lecture-problems. Prerequisites: PHY 131, PHY 151 and MAT 116. Corequisite: PHY 153.

PHY 141, 142, 143 College Physics Laboratory (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. One 1-hour laboratory. To be taken in sequence concurrently with PHY 121, 122, 123, respectively.

PHY 151, 152, 153 General Physics Laboratory (1) (1) (1) FWSpSu

Laboratory to accompany General Physics lecture series. Experiments in mechanics, hydrostatics, wave motion, thermodynamics, optics, and electricity and magnetism. One 1-hour laboratory. To be taken concurrently with PHY 131, 132, 133, respectively.

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 in the Physics Department office prior to enrollment. Total credit limited to 4 units with a maximum of 2 units per quarter.

PHY 234 General Physics (3) W

Electromagnetic oscillations, Maxwell's equations and electromagnetic waves, geometric optics, physical optics, special theory of relativity. 3 lecture-problems. Prerequisite: PHY 132, 133. Corequisite for physics majors: PHY 254.

PHY 235 Elementary Modern Physics (3) Sp

Origin of the quantum theory; Bohr theory; wave mechanics and atomic structure; introduction to nuclear physics. 3 lecture-problems. Prerequisite: PHY 234. Corequisite for physics majors: PHY 255.

PHY 254 General Physics Laboratory (1) W

Experiments on optics and electromagnetism. One 1-hour laboratory. Must be taken concurrently with PHY 234.

PHY 255 Elementary Modern Physics Laboratory (1) Sp

Experiments illustrative of modern physics. One 1-hour laboratory. Must be taken concurrently with PHY 235.

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.

PHY 304 Electronics for Scientists (4) F

For students majoring in biological sciences, chemistry, geology, and other scientific areas, as well as for physics majors. Basic concepts of electrical circuits, and solid state devices. Circuit analysis and operation of instruments commonly encountered in science lab. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: PHY 123 or 133.

PHY 305 Computer Interfacing for Scientific Data Logging (4) W

The electronic technology needed to connect scientific equipment to digital computers, including field effect transistors as temporary storage elements, elementary digital logic, ADC circuits, DAC circuits, and signal reconstruction compared to signal amplification. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: PHY 304.

PHY 306 History of Physics (4) F

History of physics from Thales of Miletus to the present with special emphasis on 19th and 20th Century developments. 4 lectures. Prerequisite: 8 units of Physics.

PHY 308 Fundamentals of Mathematical Physics (4) F

Applications of mathematical tools to problems in the study of electromagnetism, mechanics, and quantum mechanics. Linear algebra, coordinate systems, vector analysis, ordinary differential equations, Fourier series. 4 lecture-problems. Prerequisites: PHY 235, MAT 215, 216.

PHY 309 Fundamentals of Mathematical Physics (4) W

Continuation of PHY 308. Applications of gamma, beta, and error functions; functions of a complex variable; partial differential equations and boundary value problems; series solutions of ordinary differential equations in physics problems. 4 lecture-problems. Prerequisite: PHY 308.

PHY 310 Fundamentals of Mathematical Physics (4) Sp

Continuation of PHY 308 and 309. Applications of calculus of variations, tensor analysis, integral transforms, probability and statistics to physics problems. 4 lecture-problems. Prerequisite: PHY 309.

PHY 314, 315 Physics of Electric and Magnetic Phenomena (4) (4) WSp

Electrostatics, magnetostatics, circuit theory, time-varying fields, Maxwell's equations, and electromagnetic waves. 4 lecture-problems. Courses to be taken in sequence. Prerequisite: PHY 308. Corequisite: PHY 309, to be taken concurrently with PHY 314.

PHY 321, 322 Mechanics (4) (4) WSp

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 lecture-problems. Courses to be taken in sequence. Prerequisite: PHY 308. Corequisite: PHY 309, to be taken concurrently with PHY 321.

PHY 333 Thermal Physics (4) F

Fundamental principles of thermodynamics and kinetic theory of gases. 4 lecture-problems. Prerequisite: PHY 132 and MAT 215, 216.

PHY 336 Introduction to Surface Science (4) W (even years)

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 lecture-problems. Prerequisite: PHY 235 or CHM 311.

PHY 340 Energy and the Environment (4) Sp (even years)

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 lecture-problems. Prerequisite: PHY 132 or PHY 122 and a calculus course.

PHY 344 Applied Optics (4) F

Geometrical optics and wave optics with an emphasis on technological applications. 4 lecture-problems. Prerequisite: PHY 122 or 132.

PHY 346 Solid State Physics for Engineers (4) Sp

Survey of modern physics and solid state physics principles and engineering applications. Emphasis on electronic properties of semiconductors. Not open to students in the B.S. physics program (physics/engineering double majors and physics minors excepted). 4 lecture-problems. Prerequisite: PHY 133.

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 in the Physics Department office prior to enrollment. Total credit limited to 4 units with a maximum of 2 units per quarter.

PHY 401, 402 Quantum Mechanics (4) (4) F,W

Introduction to quantum mechanics, including Schroedinger equation, hydrogen atom, degeneracy, perturbation theory, multi-electron atoms, matrix mechanics. 4 lecture-problems. Prerequisites: PHY 235 or CHM 313, and PHY 309.

PHY 403 Advanced Quantum Mechanics (4) Sp

Advanced topics in quantum mechanics, including approximation methods, time-dependent perturbation theory, relativistic theory, and frontiers. 4 lecture-problems. Prerequisite: PHY 402.

PHY 404 Introduction to High Energy Physics (4) Sp

History and concepts of high energy and elementary particle physics; fundamental interactions; quantum numbers, invariance principles and conservation laws; SU(3) quark model and QCD; particle detectors and accelerators. 4 lectures. Prerequisites: PHY 401, 402.

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 lecture-problems. Prerequisite: PHY 235 and PHY 309.

PHY 407 Statistical Physics (4) W (odd years)

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 lecture-problems. Prerequisite: PHY 235, 333 and MAT 215.

PHY 410 Biophysics (3) W (odd years)

Concepts and mechanisms involved in the interpretation of biological systems. A description of living processes in physical terms. (See also BIO 410) 3 lecture-problems. Prerequisite: PHY 123, or PHY 132 and 133.

PHY 417 Optics (3) W

Mirrors, lenses, and optical instruments; interference, diffraction, polarization, and elements of spectroscopy; lasers and holography. 3 lecture-problems. Prerequisite: PHY 234. Corequisite for physics majors: PHY 418.

PHY 418 Optics Laboratory (1) W

Laboratory to be taken concurrently with PHY 417. One 3-hour laboratory.

PHY 420 Acoustics (3) Sp (odd years)

The fundamentals of acoustical vibrations, baffle effects, resonance and filters, and transmission phenomena will be presented using differential equations and complex variables. 3 lecture-problems. Prerequisites: PHY 132 and MAT 215, 216.

PHY 422 Plasma Physics (4) F (even years)

Fundamental concepts and ideas in the study of ionized gases, including orbit theory, the "two-fluid" equations, magnetohydrodynamics, andthe Vlasov theory. Plasma phenomena such as waves, diffusion, equilibrium, stability, and others. 4 lecture-problems. Prerequisite: PHY 314.

PHY 424 Astrophysics (4) F (odd years)

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. 4 lecture-problems. Prerequisite: PHY 235.

PHY 425 Space Physics (3) W (even years)

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. Prerequisites: PHY 235, 321 (may be taken concurrently).

PHY 426 Relativity, Gravity, and Black Holes (4) Sp (even years)

Review of special relativity, principle of equivalence, tensors, the metric tensor, general theory of relativity, cosmological models, gravitational waves, black holes, Hawking radiation, quantun gravity, connection with elementary particle theories. 4 lecture-problems. Prerequisite: PHY 235, 315 (may be taken concurrently), 322 (may be taken concurrently).

PHY 430 Advanced Physics Laboratory (1) FW

Topics in advanced experimental physics with emphasis on electromagnetism and mechanics. One 3-hour laboratory. Prerequisites: PHY 235, 255, 315, 322. (PHY 430, 431, and 432 may be taken in any order.)

PHY 431 Solid State Physics Laboratory (1) WSp

Topics in experimental solid state physics. One 3-hour laboratory. Prerequisites: PHY 235, 255, 315, 322. (PHY 430, 431, and 432 may be taken in any order.)

PHY 432 Nuclear Physics Laboratory (1) FSp

Topics in experimental nuclear physics. One 3-hour laboratory. Prerequisites: PHY 235, 255, 315, 322. (PHY 430, 431, and 432 may be taken in any order.)

PHY 441 Internship in Physics (2) FWSpSu

Practical, on-the-job training and work experience in physics. Approval of Physics Department Chair required prior to enrollment. Course grade determined by internship coordinator and on-job supervisor. Total credit limited to 6 units.

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. Approval of Physics Department Chair required prior to enrollment.

PHY 463 Undergraduate Seminar (2) Sp

Study of current developments in physics and discussion of periodicals of an appropriate level. 2 lecture-discussions.

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.

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.

Edward K. Mercer, *Chair*

Daniel F. Stiffler, *Coordinator*

Jonathan N. Baskin	Bruce L. Firstman	David F. Steele
Jack L. Bath	Don C. Force	Glenn R. Stewart
Peter Castro	Donald F. Hoyt	Laszlo J. Szijj
W. David Edmonds	David J. Moriarty	

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.

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.

The Zoology section also offers a curriculum leading to the Master of Science in Biology with emphasis in Zoology.

Environmental Health Sanitarian Minor

The Environmental Health Sanitarian Minor is an interdisciplinary program which may be pursued by majors in any field. Its purpose is to prepare students for careers as Environmental Health Sanitarians by meeting the standards for the state internship program. State employed sanitarians are specialists who enforce and administer laws governing water, food, and air contamination, noise, land use planning, occupational health hazards, and animal vectors of disease. The minor is particularly suitable for students majoring in Zoology.

A full description of the minor is in the "University Programs" section of this catalog.

PHYSIOLOGY MINOR

The Physiology Minor is an interdisciplinary program which can be elected by students majoring in any field. Its purpose is to improve the training and advising of students in order to facilitate their pursuit of careers in biomedical fields utilizing a knowledge of Physiology. It is particularly appropriate for students majoring in Zoology.

A full description of the minor is located in the "University Programs" section of this catalog.

CORE COURSES FOR MAJOR*

(Required of all students)

Genetics	BIO	303	(4)
Cell, Molecular, and Dev. Biol	BIO	310	(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	426	(4)
Comparative Animal Physiology	ZOO	424	(5)

Each student will complete at least 5 upper division zoology courses (26)

Students considering graduate work or professional schools, see recommended courses for preprofessional preparation. (p. 435)

* A 2.0 cumulative GPA is required in core courses in order to receive a degree in this major.

SUPPORT AND ELECTIVE COURSES

(Required of all students)

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	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)
Intro to Statistics	STA	120	(4)
Approved Electives			(12)

Approved electives include any 200, 300, or 400 level courses in the Biological Sciences Department not specifically designed for non-majors. Approved electives also include: CHM 301, 314, 315, 316, 327, 328, 329, and MAT 114, 115, 116. See advisor for approval of courses offered by other departments.

GENERAL EDUCATION REQUIREMENTS

Category I:
- A. Freshman English I ..... ENG 104 (4)
- B. Advocacy and Argument ..... COM 204 (4)
- C. Freshman English II ..... ENG 105 (4)

Category II:
- A. College Algebra ..... MAT 105 (4)
- B. College Chemistry ..... CHM 104 (3)
- C. Basic Biology ..... BIO 115 (5)
- D. Principles of Evolution ..... BIO 213 (4)

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:
BIO 205, CPU 201, CPU 202 *or* PSY 201 ..... (4)

Category VI:
Select one course from each group.
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)

ZOOLOGY MINOR

Minimum units—32
Minimum upper division units—12
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:
- Principles of Evolution ..... BIO 213 (4)
- Principles of Ecology ..... BIO 325 (4)
- Comparative Animal Physiology ..... ZOO 424 (5)

At least two courses from the following list of courses to complete the minor:
- Human Anatomy ..... ZOO 234 (4)
- Human Physiology ..... ZOO 235 (4)
- Ornithology ..... ZOO 329 (3)
- Embryology ..... ZOO 414 (5)
- Animal Behavior ..... ZOO 419 (3)
- Histology ..... ZOO 422 (5)
- Introduction to Entomology ..... ZOO 426 (4)
- Comparative Anatomy of Vert ..... ZOO 451 (5)
- Medical Parasitology ..... ZOO 425 (5)
- Herpetology ..... ZOO 429 (4)
- Mammalogy ..... ZOO 430 (4)
- Public Health Entomology ..... ZOO 435 (4)
- Evolution of the Invertebrates ..... ZOO 438 (5)
- Physiological Ecology of Animals ..... ZOO 440 (4)
- Ichthyology ..... ZOO 441 (4)

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 two-hour 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, 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. *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 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 lecture-problems, 2 three-hour laboratories. Prerequisite: BIO 115. *Bath*

ZOO 235 Human Physiology (4) FWSp

Functions of the major organ systems of the human body with emphasis on the homeostatic mechanisms. 3 lecture-problems, 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-problems, laboratory, or a combination of both. *Staff*

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 lecture-problems, 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 of selected problems or supervised attendance for juniors and seniors at department seminars. Discussions and reports required. Enrollment requires: 1) Prior arrangement with a faculty member. 2) Completion of a supervisory form available from 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 1989 (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-problem, 2 three-hour laboratories. Prerequisite: ZOO 137 or consent of instructor. *Firstman*

ZOO 414 Embryology (5) FWSp

Embryonic development of the vertebrate body. 2 lecture-problems, 3 three-hour laboratories. Prerequisite: ZOO 138. *Firstman*

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 lecture-problems, 1 three-hour laboratory. Prerequisite: ZOO 138 or consent of instructor. *Szijj*

ZOO 422 Histology (5) Sp

Microscopic study of vertebrate tissues; organology and correlation of form with function. 2 lecture-problems, 3 three-hour laboratories, taught in the audio-tutorial mode. Prerequisite: ZOO 138. *Roche*

ZOO 424 Comparative Animal Physiology (5) FW

Introduction to functions of vertebrate and invertebrate organ systems. 3 lecture-problems, 2 three-hour laboratories. Prerequisites: ZOO 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 lecture-problems, 2 three-hour laboratories. Prerequisite: ZOO 137. *Castro*

ZOO 426 Introduction to Entomology (4) FSp

General aspects of insect structure and function, development, behavior and influence on human activity; includes a survey of the principal insect groups. 3 lecture-problems, 1 three-hour laboratory. Prerequisites: BIO 115, ZOO 137 or consent of instructor. *Edmonds, Force*

ZOO 429 Herpetology (4) Sp

Morphology, classification, distribution, ecology, behavior and conservation of amphibians and reptiles; identification, and field study of local species. 2 lecture-problems, 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 lecture-problems, 2 three-hour laboratories. Prerequisite: ZOO 138 or equivalent. *Stewart*

ZOO 435 Public Health Entomology (4) W

Role of insects, mites, ticks and other arthropods in the causation and transmission of human disease. 3 lecture-problems, 1 three-hour laboratory. *Force*

ZOO 438 Evolution of the Invertebrates (5) Sp (eyen years)

A systematic survey of all invertebrate groups including the minor phyla, with emphasis upon comparative morphology and phylogeny, including also comparative developmental and physiological evidence of evolutionary relationships between the higher taxa. 4 lecture-problems, 1 three-hour laboratory. Prerequisite: ZOO 137 or equivalent. *Firstman*

ZOO 440 Physiological Ecology of Animals (4) W

A combined lecture and group discussion of the physiological and behavioral adaptions of animals to their environment. Emphasis on energetics, thermoregulation, and the evolution of endothermy and homeothermy in terrestrial vertebrates. Additional topics selected by students. Lab consists of an independent research project. 3 lecture-problems, 1 three-hour laboratory. Prerequisite: ZOO 424 or consent of instructor. *Hoyt.*

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 lecture-problems and 2 three-hour laboratories. Prerequisite: ZOO 138 and permission of instructor. *Baskin*

ZOO 451 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 lecture-problems. 2 three-hour laboratories. Prerequisite: ZOO 138. *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-problems, laboratory, or a combination of both. *Staff*

INSTITUTE FOR ADVANCED SYSTEMS STUDIES

One of the Minors offered in the College of Science is Comparative Systems Analysis. It is also offered as a Certificate Program through the Kellogg-West Continuing Education Program.

Len Troncale, *Coordinator, Minor; Director, Institute*

Fellows of the Institute:

Chuck Amelin (Math)
Bernard Banks (Math)
David Berry (Geology)
Sid Blumner (Economics)
Soumya Chakravarti (Physics)
Richard DeNouvellis (Educ.)
John Fisher (Computer Sci.)
Carlos Ford-Livene (Math)
Dhanwant Gill (Math)
Larry Herber (Geology)
Emil Herzog (Math)
Bill Larson (Behav. Sci.)
Chung Lee (Computer Sci.)
John Lyle (Land. Arch.)
Jim Manley (Philosophy)
Frank Mathur (Math)
Walter Maya (Chemistry)
Steve McCauley (Physics)
Earl Pye (Chemistry)
Ron Quinn (Biology)
Carl Rathman (Engineering)
Harold Schleifer (Library)
Scott Sportsman (Math)
Mel Stanley (Geography)
Len Troncale (Biology)
Mark vonWodtke (Land. Arch.)

With Associate Fellows: Mike Hamilton (Ecology); Albert Wilson (Astronomy & Math); and Donna Wilson (Psychology & Math)

The Institute offers interdisciplinary courses for general purposes as well as leading to the Minor and Certificate in Comparative Systems Analysis. The Minor is designed to complement a wide variety of major fields from the various schools in the University. The diverse specialties of Systems Analysis in Business, Management, Information Systems, Computer Systems, Environmental Design fields, and Engineering constitute the fastest growing job category in the United States over the next decade according to government statistics. Students completing this Minor in conjunction with a major in their specialty fields will have developed skills in high demand for analyzing complex modern societal problems. Coursework in this Minor emphasizes the pure science aspects of systems; it focuses on what might be called the special theoretical knowledge of systems fundamental to the many practical applications mentioned above. Lab and field experiences in the Minor focus on application of transdisciplinary techniques and methodology, and expose the student to ideas and faculty from a broad spectrum of specialties unified by general systems analytic approaches. The Minor and Certificate in Comparative Systems Analysis requires the completion of a minimum of 32 units. Admission to the Minor and Certificate Programs is required previous to enrollment in these courses. Interested students should contact Dr. Troncale.

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 hypotheses 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.

CENTER FOR HOSPITALITY MANAGEMENT

Robert W. Small, *Director*

Thomas A. Costello
Gary A. Hamilton
Sandra A. Kapoor
Tarun Kapoor
Mark A. Lipsitt
William B. Martin
James McClain
Robert A. Palmer
Ralph Scarrow
Kenneth Smith
Leslie B. Stevens
Glenn B. Voss

The Center for Hospitality Management offers a four year curriculum which leads to a Bachelor of Science Degree in Hotel and Restaurant Management. The major focus of the program is to develop managerial knowledge and skills essential for success in the hospitality industry with an emphasis on those competencies needed for managing restaurants, hotels, clubs and related operations.

The program provides students a combination of general education coursework linked with a core of business and hospitality management courses designed to facilitate an understanding of the economic, legal and social forces which shape the hospitality industry and to provide a practical base of hospitality knowledge and abilities. Major coursework emphasizes human relation skills as well as qualitative and quantitative critical analysis.

A food and beverage practicum as well as additional laboratory experiences in food preparation, service, hotel operations, and property management are part of the course of study. Students are required to complete eight hundred (800) hours of work experience in hospitality related employment prior to graduation.

The Hotel and Restaurant Management program is housed in the James and Carol Collins Center for Hospitality Management. The Center is specifically designed for this program and houses a public, student-operated full-service restaurant as well as additional laboratory, classroom and administration facilities.

The Center is the recipient of major research funding to study energy usage, energy management and foodservice equipment for the hospitality industry being conducted in conjunction with the Colleges of Engineering and Environmental Design. The Center is endowed with the Richard N. Frank Distinguished Lectureship Series and the Richard A. and Nancy A. Murbach Endowment Scholarship in Free Enterprise awarded quarterly to the outstanding student in catering management. A wide range of scholarships are available to eligible students each year.

CORE COURSES FOR MAJOR *

Intro to Bus Per Comp	CIS	111	(4)
Leg Env of Bus Trans	FRL	201	(4)
Financial Acctg	ACC	224	(4)
Financial Acctg	ACC	225	(4)
Prin Org Thry & Beh	MHR	301	(4)
Prin Mktg Mgmt	MKT	301	(4)
Intro to Fin Mgmt I	FRL	304	(4)
Mgrl Stat	OM	314	(4)

Hotel and Restaurant Management Req. Courses

Foundation Series:

Intro to Leis Ind	HRT-	101	(4)
Hotel & Rest San & Safety	HRT	225	(2)
Hotel and Rest Superv	HRT	245	(4)

Data Information Series:

Hotel & Rest Acctg	HRT	374	(4)
Food & Bev Cost Cnt	HRT	375	(4)
Comp Applic—Hosp	HRT	380	(4)

Tech./Applied Mgt.:

Hotel & Rest Steward	HRT	300	(4)
Prop Maint Mgmt	HRT	305	(4)
Hotel & Rest Law	HRT	310	(4)

Food & Bev. Series:

Comm Food Prep	HRT	381	(4) #
F & B Operations	HRT	382	(4) #
F & B Practicum	HRT	383	(8) #*
F & B Seminar	HRT	384	(4)*

Critical Thinking/Prob. Solv.:

Hosp Mgmt Policy	HRT	410	(4)
Senior Proj	HRT	461	(2)
Senior Proj	HRT	462	(2)

* Must take concurrently

*A 2.0 cumulative GPA is required in core courses including option courses for the major in order to receive a degree in this major.

Must take consecutively.

SUPPORT AND DIRECTED ELECTIVES

Major Required Support Courses:

Select 20 units from the following courses with advisor approval. 8 of the 20 units of major required support courses may be taken within the School of Business Administration, Foods and Nutrition Department, or in another discipline with approved petition.

Travel Mgmt	HRT	201	(4)
Quick Foodserv Mgmt	HRT	235	(4)
Front Office Operations	HRT	275	(4)
Wines and Spirits	HRT	315	(4)
Club Mgmt	HRT	320	(4)
Hotel Housekeeping Mgmt	HRT	323	(4)
Labor Law Hosp Industry	HRT	340	(4)
Travel Geog	HRT	345	(4)
Hotel & Rest Layout	HRT	365	(4)
Bev Mgmt	HRT	385	(4)
Hotel Mkt, Sales & Pub	HRT	390	(4)
Rest Prop Dev H/R	HRT	395	(4)
Catering & Fin Dng	HRT	401	(4)
International Travel	HRT	415	(4)
Hotel Operations	HRT	425	(4)
Hosp Info Systems Seminar	HRT	480	(4)
Meat Utilization	AS	327	(4)
Intro to Foods	FN	121	(4)
Food Procurement	FN	354	(3)
Unrestricted Electives			(12)

Consult advisor to determine under what category HRT 200, 299, 400, 441, and 499 can be applied.

In addition to above coursework students must put in 800 hours of industry work experience required for graduation.

General Education Requirements:

Category I—12 units

A. Freshman English I	ENG	104	(4)
B. Advocacy & Argument	COM	204	(4)

C. Report Writing	COM	216	(4)
Category II—16 units			
A. Elemen Statistics	STA	120	(4)
B. One course			(4)
C. One course			(4)
D. Contemp Asp of Nutr	FN	205	(4)
Category III—12 units			
A. One course			(4)
B. Bus and Prof Ethics	PHL	205	(4)
C. One course			(4)
Category IV—12 units			
A. Prin of Econ	EC	201	(4)
or			
Prin of Econ	EC	202	
B. Interper Comp in Org Set	MHR	318	(4)
C. One course			(4)
Category V—4 units			
Gen Psych	PSY	201	(4)

Category VI—8 units (one course from ea. group):

Group 1

Am Civilization	AMC	201	(4)
or			
Intro to Am Govt	PLS	201	(4)
Group 2			
Am Civilization	AMC	202	(4)
or			
U.S. Hist since Reconstruc	HST	202	(4)

Category VII—8 units

Pkg. A (select two):
COM 321, SP 307, SP 309.

Pkg. B (select two):
COM 302, COM 313, COM 315

Pkg. C:
MHR 438; MHR 452

Course Descriptions

HRT 101 Introduction to the Leisure Industry (4)

Overview of the leisure industry with emphasis on the hotel, restaurant and club fields. 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 225 Hotel and Restaurant Sanitation and Safety (2)

Safety and sanitation as it affects the individual and the operation. Prevention and control of problems encountered in guest, customer and employee safety and sanitation. Topics include accident and fire prevention, security maintenance and foodborne illness. 2 lecture-discussions. Prerequisite: HRT 101.

HRT 235 Quick Foodservice (QFS) Management (4)

The quick foodservice industry (fast foods, limited menu restaurants, cafeterias) will be introduced using case studies, written analyses, student presentations, and operation development projects. Areas covered will include franchiser-franchisee relationship, menu development, and service systems. 4 lecture problem solving. Prerequisite: HRT 101.

HRT 245 Hotel and Restaurant Supervision (4)

Management of personnel in the hospitality industry. Application of supervision concepts and techniques to restaurants and hotels including leadership, communication, selecting, training, performance appraisal, motivation, coaching, delegation, decision making and planning. Case studies. 4 lecture problem solving. Prerequisite: HRT 101.

HRT 275 Front Office Operations (4)

Front office systems. An examination of room reservations, forecasting, registration and room assignment, room rate strategies, billing and credit procedures, night audit, statistical analysis of occupancy and revenue data, guest relations and interpersonal dynamics. 3 lecture-problem solving, 1 three-hour laboratory. Prerequisite: HRT 101.

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 300 Hotel and Restaurant Stewarding (4)

Policy, procedures, controls and their implementation in purchasing hotel and restaurant merchandise and supplies: equipment, serviceware, furniture, fixtures, art, contract services, food and beverage. Written analyses and evaluation of purchasing procedures, specification manuals, and receiving reports required. 3 lecture problem solving, one 3-hour laboratory. Prerequisite: HRT 225.

HRT 305 Property Maintenance Management (4)

Comprehensive application of basic science to operation and maintenance of electrical and mechanical equipment via prepared analyses, written reports. Problem solving and solution techniques are emphasized. Includes refrigeration, heating, ventilation and air conditioning; kitchen and cleaning equipment; fire protection, safety. 3 lecture problem solving and one 3-hour laboratory. Prerequisite: STA 121.

HRT 310 Hotel and Restaurant Management Law (4)

Fundamentals of law of particular importance to hotels, restaurants, resorts and associated business; includes duties, rights and liabilities of the innkeeper-host and the guests. Cases. 4 lecture problem solving. Prerequisite: FRL 201.

HRT 315 Wines and Spirits (4)

Study of 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 evaluations. 4 lecture discussion. Prerequisite: Minimum age of student: 21 years.

HRT 320 Club Management (4)

Prepares the student for operation of private clubs and tourist attractions. Selected topics including organization, personnel practices, controls, housekeeping, finance, marketing, program management, risk management, taxes and regulation are evaluated through case studies, written reports and student analyses. 4 lecture presentations. Prerequisite: HRT 245.

HRT 323 Hotel Housekeeping Management (4)

A functional examination of the hotel housekeeping department with an emphasis on: personnel management, staffing schedules, sanitation issues, technical innovations, equipment and supplies, linen/laundry considerations, storage, as well as training and purchasing systems, maintenance and engineering, plus employment and labor utilization issues. Lecture and discussion. 3 lecture-problem solving, 1 three-hour laboratory. Prerequisites: HRT 275 and HRT 305.

HRT 340 Labor Law in the Hospitality Industry (4)

An examination of current labor law and its impact on the operation of hotels and restaurants. Includes state and federal regulations, court decisions and legislative requirements as they relate to hiring/recruitment, affirmative action, equal employment, collective bargaining, union avoidance, employee relations, discrimination in the workplace, as well as workers' compensation and wages. Lecture and case studies. Prerequisite: HRT 310.

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 365 Hotel and Restaurant Layout and Design (4)

Evaluation of work analysis, design procedures, human engineering and activity analysis. Project-based course analyzing and developing solutions to layout and design facilities for hotels and restaurants which address employee needs, and productivity, and the guests' needs and comfort. 4 lecture problem solving. Prerequisites: HRT 325 or HRT 383.

HRT 374 Hotel and Restaurant Accounting (4)

Comprehensive application of accounting principles to the hospitality industry: accounting practices, financial statements, income/expense account and statements, special purpose journals and ledgers. Problem solving methods applied to managerial decisions. 4 lecture problem solving. Prerequisite: ACC 225.

HRT 375 Food and Beverage Cost Controls (4)

Analyzing food, beverage and labor cost controls. Problem solving and solution techniques are applied by students in realistic operational situations. Areas covered include cost, volume, profit relationships, food cost determination, standard costs, forecasting, sales control and menu pricing. 4 lecture problem solving. Prerequisites: HRT 290, HRT 381.

HRT 380 Computer Applications for the Hospitality Industry (4)

Review of hardware and software available for the hospitality industry. Applications and problem solving using available packages will be emphasized in the areas of point of sale, menu planning, cost control, beverage control, back office systems and reservation systems. 3 lecture problem solving, 1 three-hour laboratory. Prerequisites: CIS 111, HRT 375.

HRT 381 Commercial Food Preparation (4) FWSp

Study of products and equipment used in food preparation. Kitchen safety emphasized with food preparation techniques. Analysis of menus and service subsystems. 2 lecture problem solving and two 3-hour laboratories. Prerequisites: FN 121, HRT 225. This course is the introductory course of a year-long series, HRT 381, HRT 382 and HRT 383.

HRT 382 Food and Beverage Operations (4) FWSp

Analysis and simulation of a restaurant operation. Competency-based skills in dining room management, menu management, customer relations, dining room/kitchen/bar interrelationships and labor management. 2 lecture problem solving, two 3-hour laboratories. Prerequisite: HRT 381, which must be taken immediately prior to this course.

HRT 383 Food and Beverage Practicum (8) FWSp

Practice and application of kitchen and dining room sales and service concepts and techniques. Actual work experience in food preparation, waiting and busing tables, serving wine, beverages and food. An emphasis in dining room supervision and sales techniques. Four 6-hour laboratories. Prerequisite: HRT 382, which must be taken immediately prior to this course. HRT 384 must be taken concurrently with this course.

HRT 384 Food and Beverage Seminar (4) FWSp

Capstone course intended to integrate the food and beverage practicum with principles and theory of the hospitality industry. Conceptual, analytical, and decision-making skills developed through case studies and systems evaluations. 4 seminars. Prerequisite: HRT 382. HRT 383 must be taken concurrently with this course.

HRT 385 Beverage Management (4)

Planning, organizing and analyzing of a beverage facility. Problem solving methods and solution techniques are applied through written projects and an on-the-job laboratory. Topics include alcoholic beverage control regulations, examination of product, service methods and computerized control systems. 3 lecture problem solving and one 3-hour laboratory. Prerequisites: HRT 300; HRT 325 or HRT 382; HRT 380.

HRT 390 Hotel Marketing, Sales and Public Relations (4)

Analysis and application of the principles of marketing to hotel operations. A project-based course that includes problem-solving and solution techniques applied to factors that impact the marketing and promotion of the hotel business. 4 lecture problem solving. Prerequisites: HRT 325, MKT 301.

HRT 395 Restaurant Property Development (4)

Project-based course. Planning a restaurant from concept to opening: location and market analysis; 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. 4 lecture problem solving. Prerequisites: HRT 375, HRT 383.

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 and Fine Dining Management (4)

Marketing and managing 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. Emphasis is on creating and managing catered functions. 2 hours lecture problem solving, 6 hours laboratory. Prerequisites: HRT 375, HRT 383.

HRT 410 Hospitality Management Policy (4)

Integrated seminar in the application and development of policy matters for hospitality management. Case-problem analysis involving hospitality business functions and application of analytical techniques to this industry. 4 seminar discussion. Prerequisites: HRT 375, HRT 384.

HRT 415 International Travel (4)

Description and analysis of international travel from the view of the American traveler and the travel entrepreneur. Communication of solutions to problems of travel, tourism development, analysis of popular international travel destinations. 4 lecture problem solving. Prerequisite: HRT 201.

HRT 425 Hotel Operations (4)

Analysis and simulation of a hotel operation. Competency-based skills developed by prepared student analyses, written reports, and on-the-job learning opportunities in the front office, guest services, maintenance and engineering, housekeeping and function coordination. 2 lecture problem solving, two 3-hour laboratories. Prerequisites: HRT 225, HRT 245.

HRT 441 Internship in Hotel and Restaurant Management (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. Total credit limited to six units. Prerequisite: Consent of advisor.

HRT 461, 462 Senior Project (2) (2)

Selection of a current development or problem in the hotel, restaurant or travel industry. Completion of a written project under faculty supervision. Required minimum 120 hours. Prerequisite: senior standing.

HRT 475 Hotel and Restaurant Seminar (4)

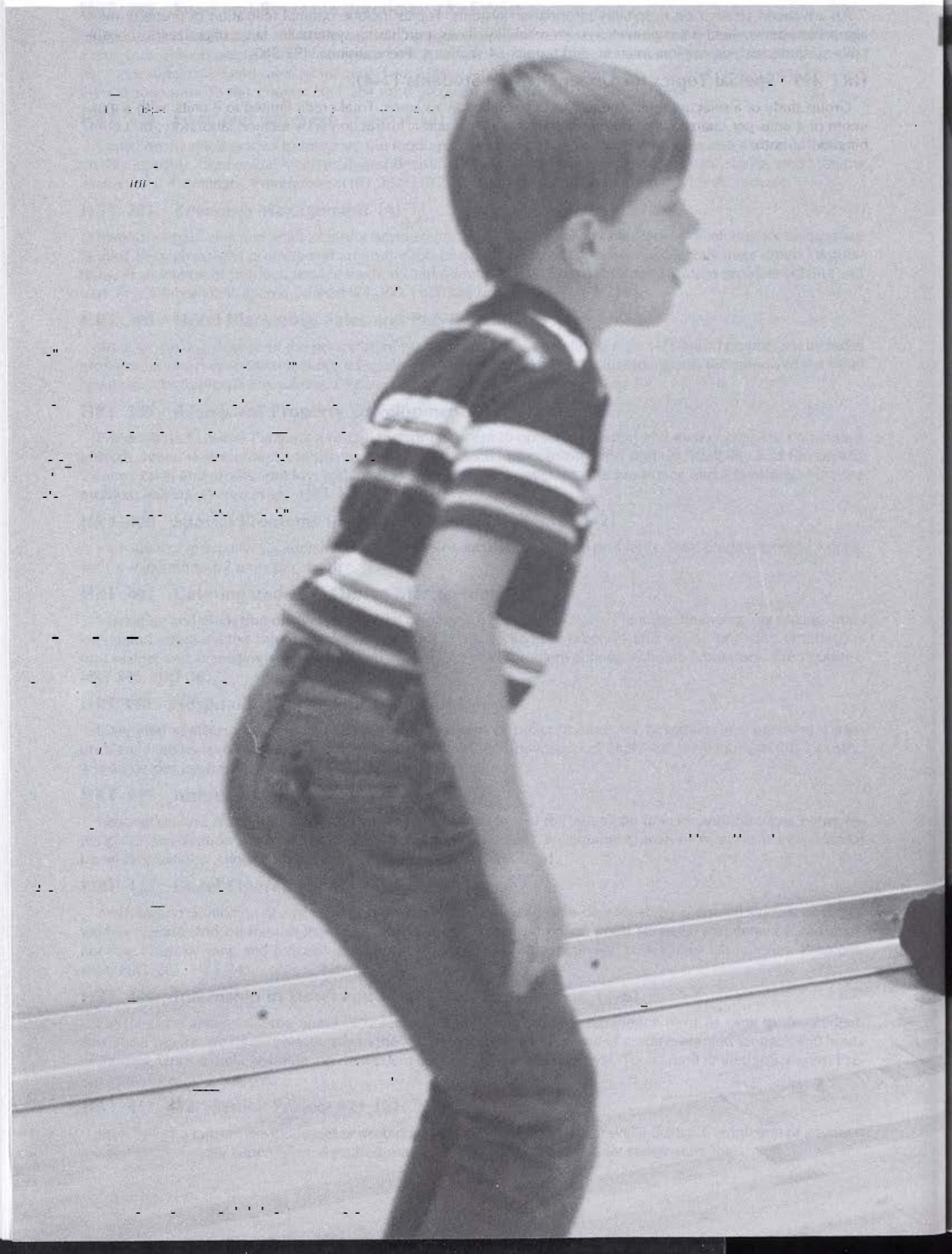
Capstone course intended to integrate various disciplines within the hospitality industry. Conceptual, analytical, and decision-making skills developed through case studies and corporate evaluations. 4 seminars. Prerequisite: HRT 410.

HRT 480 Hospitality Information Systems Seminar (4)

An advanced seminar on hospitality information systems. Topics include optimal utilization of property management systems, yield management, system reliability/flaws, purchasing systems for large organizations, hospitality systems analysis, implementation, and training. 4 seminars. Prerequisites: HRT 380.

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.



SCHOOL OF EDUCATION



SCHOOL OF EDUCATION

David M. Greene, *Director*

Ellen Curtis-Pierce, *Associate Director*

Roy Armstrong
Frederick J. Baker
Barbara E. Bromley
Sarah W. Day
Carolyn H. Denham
Richard DeNovellis
Gary M. Garfield
David M. Greene
Richard C. Jacobs
Dennis R. Jacobsen
Constance Lim
Dorothy MacNevin
Jane McGraw
Susan Mortorff-Albert
Robert Muffoletto
Evelyn Rossi
George Shail
Roslynn Seidenstein
Cecilia Cota-Robles-Suarez
Yvonne L. Turner

PARTICIPATING FACULTY

Flint Freeman, Agriculture
Diane Divelbess, Art
Don Morris, HPERD
Anne Schatz, Business
James Westbrook, Music
Judith Jacobs, Mathematics
Judith Anderson, Social Sciences
Gloria Lothrop, History
John Maitino, English
Ruby Trow, Home Economics
Frederick J. Baker—Coordinator of Teacher Education
Dorothy MacNevin—Coordinator of Field Placement
Jane S. McGraw—Coordinator of Graduate and Professional Studies
Barbara E. Bromley—Coordinator of Special Education Specialist Credentials Program
Cecilia Cota-Robles Suarez—Coordinator of Multiple Subjects-Bilingual/Cross-Cultural Credential Program
George Shail—Coordinator of Educational Computer Technology
Robert Muffuletto—Coordinator of Educational Technology and Media Studies

GENERAL INFORMATION

Public school teaching and credentials in the State of California are regulated by the State of California. All programs for students seeking credentials are approved and monitored by the Commission on Teacher Credentialing. Since credential programs described in this publication are subject to change, students are urged to seek current information concerning new credential requirements from appropriate advisors in the School of Education.

CREDENTIALS OFFERED AT CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

The preparation of teachers 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 program-related issues including student selection. They also serve as departmental advisors to credential and degree students for program planning. The university has been approved to offer programs leading to the following credentials and areas of specialization:

(1) Basic Teaching Credentials: Multiple Subjects, Multiple Subjects-Bilingual Emphasis, Single Subject. '
(2) Specialist Credentials: Agriculture, Special Education-Learning Handicapped, Severely Handicapped, Adaptive Physical Education.
(3) Certificates: Educational Computer Technology, Educational Technology and Media Studies, Resource Specialist.

The basic credential programs emphasize the integration of theory and practice in the study of educational foundations, curriculum and methodology, and the teaching of reading. The graduate program expands these concepts to enable the student to function as an educational specialist working in the schools.

ADVISEMENT FOR BASIC CREDENTIALS

Students should initiate contacts and appointments for appropriate program advisement at the earliest possible time in their undergraduate program. Since it is possible to begin the credential program in the junior year, and there are important prerequisite requirements for entrance, it is recommended that contact be made during the

sophomore year. Students should know that only 13 units completed while in undergraduate status may be petitioned for credit against graduate requirements. Basic credential information materials can be secured at the Teacher Education Office, Building 5, Room 224. Information regarding state credentialing requirements can be obtained from the Cal Poly Credential Analyst. Advisement regarding admission to the professional preparation (credential) programs may be obtained from the appropriate program coordinator in the School of Education.

Advice regarding the academic major is available in the appropriate department. State credential regulations require students to verify knowledge in their subject area either by successfully completing the appropriate state adopted examination or by completing an approved academic program of study.

Students ultimately seeking the Multiple Subjects Credential will normally major in Liberal Studies. Cal Poly is approved to offer programs of study in the following subjects for students planning to enter the Single Subject Credential Program:

Agriculture	Government	Music
Art	History	Physical Education
Behavioral Science	Home Economics	Physical Sciences
Business	Life Science	Social Sciences
English	Mathematics	

REQUIREMENTS FOR BASIC CREDENTIALS

The requirements for clear Multiple Subjects and Single Subject Credentials are the following:

1. A baccalaureate (or higher) degree, in any major other than professional education, from an institution approved by the California Commission on Teacher Credentialing;
2. Successfully passing the California Basic Education Skills Test; (CBEST)
3. Satisfactory completion of at least 2 semester or 3 quarter units of work on the provisions and principles of the Constitution of the United States or successfully passing a satisfactory examination; (Cal Poly students automatically fulfill this requirement with completion of B.A. degree.)
4. Satisfactory completion of an approved program of professional preparation, including student teaching. This program usually takes four quarters of full-time course work to complete;
5. Satisfactory completion of 4 quarter units of current reading methodology or successfully passing the NTE-Reading Methodology Examination;
6. Demonstration of subject matter competence (in the initial subject credential) achieved through completion of a program of study within a major approved by the California Commission on Teacher Credentialing and by certification by discipline area department. The requirement can also be met by passing the appropriate sections of the National Teacher Examination;
7. A fifth year of college or university postgraduate education. Course work taken in graduate status must be at the upper division or graduate level;
8. Satisfactory completion of a course requirement in health education (including, but not limited to, emphasis on nutrition, and on the psychological and sociological effects of abuse, alcohol, narcotics, and drugs, and the use of tobacco). PE 441 or 442 may fulfill this requirement; and,
9. Satisfactory completion of training in the needs of, and methods of providing educational opportunities to individuals with exceptional needs. EDU 454 meets this need.
10. Evidence of completion of computer competency through EDU 455 or equivalent as required by the major.

Students may be recommended for a preliminary credential upon completion of requirements 1-6. Requirements 7-9 must be completed within five years of the date of the issuance of the preliminary credential.

During the junior and senior years, courses in professional education (EDU courses) may be taken out of the elective units allowed in the major. Coursework taken while an undergraduate can be transferred to graduate status if the courses are not required for graduation (for a maximum of 13 units). These courses must be upper division or graduate level in the major, in the School of Education, or directly related to increasing the student's competency as a teacher. The provisions governing courses taken by undergraduates for graduate credit are found in this catalog under the Academic Policies section of Academic Regulations and Programs.

ADMISSION PROCEDURES FOR THE BASIC CREDENTIAL PROGRAMS

Admission to the university does not constitute automatic admission to the Multiple and Single Subject Teacher Education Programs. Undergraduate students **must** apply for program admission prior to, or while concurrently enrolled in EDU 301-Introduction to Schooling. Undergraduate students who are not admitted prior to or during completion of EDU 301 will not be permitted to register in credential program methods courses. Both programs utilize the services of a selection committee (the Multiple Subjects Selection Committee and the Single Subject Committee). The committees are composed of university-wide representatives who make recommendations regarding application to the program. All fifth year students must be admitted to the Teacher Education program in order to take basic credential courses. The process of obtaining a teaching credential includes the following steps:

1. Admission to the Teacher Education Program.
2. Admission to student teaching
3. Application for the credential

STEP 1: REQUIREMENTS FOR ADMISSION TO THE MULTIPLE SUBJECTS PROGRAM AND THE SINGLE SUBJECT PROGRAM:

1. Application for admission to the program.

2. GPA as required in accordance with Executive Order 547.
   (GPA for each major may vary—refer to current list available in the School of Education)
3. Letter of Exception if GPA requirement (or any other requirement) is not met.
4. Completion of EDU 301-Introduction to Schooling or waiver of same based on appropriate teaching experience.
5. Two (2) letters of recommendation. At least one must be based on academic performance.
6. Satisfactory progress in appropriate subject matter waiver or passage of NTE in subject to be taught before student teaching.
7. Evidence that the student has registered to take CBEST.
8. Purpose or Statement of Intent for pursuing a teaching credential. (to be addressed as an essay)
9. Verification of Writing Proficiency—to be verified by one of the following: a) Score of 41 in writing portion of CBEST, or, b) Passage of GWT. "Waivers" do not apply.
10. Measles/Rubella Immunization.
11. Character and Identification Clearance application or fingerprint clearance. (Clearance must be received from Sacramento prior to student teaching)
12. Official transcripts required from all colleges/universities attended, including those from Cal Poly.
13. Oral Interview.

Evaluation of the student's qualifications as a credential student, in addition to the above requirements include, but are not limited to the following:

a. Personal Adjustment. Evidence of satisfactory personal adjustment, habits, interests and attitudes as shown by evaluation instruments, observations, interviews, and faculty ratings.
b. Physical Fitness: Evidence of good physical health.
c. Scholarship: Must meet appropriate GPA at the time of admission, and must maintain a GPA of 3.0 in all classes attempted including student teaching.
d. Professional Attitude: Documents evidence of ability and willingness to work with pupils, parents and school personnel through successful experiences in working with children and youth/or other school related activities.

The university sponsorship of the credential applicant is a voluntary act that is offered only when the student has successfully completed (in the judgment of the university) all the professional preparation requirements. These requirements are subject to change. For up-to-date information, students should consult the program coordinator in the School of Education.

STEP 2: REQUIREMENTS FOR ADMISSION TO STUDENT TEACHING:

1. Application for student teaching to be submitted to the Credential Office one quarter prior to student teaching. (Application deadlines are posted by the Credential Office)
2. CBEST must be passed as a condition of placement into student teaching.
3. Evidence of subject matter competence must be provided through either passage of the appropriate NTE or completion of subject waiver program. Passing scores, and/or verification of completion of subject waiver program must be received prior to Selection Committee meeting date.
4. Transcripts from Cal Poly including last quarter attended.
5. Verification, prior to Selection Committee meeting date, GPA of 3.0 in all EDU courses, and 2.75 minimum GPA in subject waiver courses. Grades lower than a "C" in EDU courses will not be honored.
6. Verification, prior to Selection Committee meeting date, of the completion of all conditions and/or prerequisites listed at the time of admission to the program.

MULTIPLE SUBJECTS PROGRAM

The following is the program of study for Multiple Subjects Credential candidates. Students must be officially admitted to the Multiple Subjects Credential Program prior to registering for any of the EDU courses listed below:

	Units
Educational Foundations	
EDU 420—Dynamics of Teaching in a Pluralistic Society	4
EDU 421—Psychology in the Instructional Process	3
Methodology	
EDU 422—Reading for Elementary Classroom Teachers	4
EDU 423—Integrated Theory and Practice of Elementary Schooling	3
EDU 424—Approaches to Teaching Literature and the Language Arts	2
EDU 425—Elementary Education: Mathematics	3
EDU 426—Elementary Education: Social Science	2
EDU 431—Elementary Education: Science	2
Student Teaching	
EDU 427—Elementary Student Teaching I	9
EDU 428—Seminar: Elementary Student Teaching I	1
EDU 429—Elementary Student Teaching II	9
EDU 430—Seminar: Elementary Student Teaching II	1
*EDU 454—Exceptional Children and Youth	3
*PE 441—Elementary School Health Education	3

*EDU 455—Educational Computer Technology Science 3

Recommended Elective Courses

MU 401—Music Literature for Children 4
ART 405—Art in the Classroom 4
PE 328—Developmental Movement for Children 3

MULTIPLE SUBJECTS-BILINGUAL/CROSS-CULTURAL EMPHASIS (CHICANO)**

A Multiple Subjects-Bilingual/Cross-Cultural Credential Program is also offered. In addition to required course work, the student for this credential must successfully pass entrance and exit examinations. These examinations, based on California Commission on Teacher Credentialing requirement levels, include: (1) knowledge of bilingual, ESL methodology, and linguistics; (2) ability to speak, read, and write Spanish, and (3) knowledge of Chicano and Mexican culture and life style.

SINGLE SUBJECT PROGRAM **

The following is the program of study for Single Subject Credential candidates. Students must be officially admitted to the Single Subject Credential Program prior to registering for any of the EDU courses listed below:

Educational Foundations	*Units*
EDU 420—Dynamics of Teaching in a Pluralistic Society	4
EDU 421—Psychology in the Instructional Process	3
Methodology	
EDU 432—Teaching Reading in the Content Area	4
EDU 433—Organizational and Instructional Methods for Secondary Classrooms	4
EDU 434—Curriculum and Methods for Content Area Teachers	4
Student Teaching	
EDU 435—Secondary Student Teaching I	9
EDU 436—Seminar: Secondary Student Teaching I	2
EDU 437—Secondary Student Teaching II	9
EDU 438—Seminar: Secondary Student Teaching II	2
*EDU 454—Exceptional Children and Youth	3
*PE 442—Secondary School Health Education	3
*EDU 455—Educational Computer Technology Science	3

* Required for clear credential. Computer literacy requirement fot the clear credential became effective July 1, 1988. EDU 455 or other approved courses may meet this requirement. See advisor in EDU for a listing of all approved computer/technology courses.

** This program may be subject to course unit changes. Contact the School of Education for verification.

Course Descriptions

EDU 301 Field Experience—Introduction to Schooling (4)

Overview of schooling; orientation to the role of the professional educator, districts and its schools, community, personnel, governance, climate, administrative organization and curricula activities. Supervised focused observation/participation. May be required for admission to the Basic Credential programs if student has not met the early field experience requirement in any other approved way. See advisor in EDU for further information. Weekly seminar.

EDU 415 Reading and Language Instruction: Bilingual Bicultural Reading and Research (4)

Reading instruction in Spanish and English. Incorporates procedures for instruction from Spanish to English. 4 lecture-problem solving.

EDU 420 Dynamics of Teaching in a Pluralistic Society (4)

Provides prospective teachers opportunities to explore and analyze from an historical, contemporary and future perspective, the legal, economic, political, demographic, cultural and linguistic issues inherent in teaching diverse student populations. 4 seminar-discussions. Prerequisite: EDU 301 or consent of instructor.

EDU 421 Psychology in the Instructional Process (3)

Educational psychology, psycho-social and cognitive development. Behavioral theory and humanistic psychology. Analysis of learning processes, behavioral objectives and evaluation of cognitive abilities. Linguistic and cultural relevancy in educational psychology. 2 lectures; 1 two-hour activity. Prerequisites: PSY 310, 311, or 312, EDU 456 or consent of instructor.

EDU 422 Reading for Elementary Classroom Teachers (4)

Developmental reading instruction; analysis of diagnostic and prescriptive strategies for the elementary classroom. Use of informal reading inventories and approaches to the teaching of reading including fieldwork. 3 seminar-discussions; 1 two-hour activity. Prerequisite: EDU 420 or 421.

EDU 423 Integrated Theory and Practice of Elementary Schooling (3)

Problem-solving and decision-making processes of effective schooling and classroom practices, including curriculum rationale and planning; lesson presentations skills. Analysis of major instructional strategies, parent participation, field trips, and principles of classroom management. 2 seminar-discussions; 1 two-hour activity. Prerequisite: EDU 421.

EDU 424 Approaches to Teaching Literature and the Language Arts (2)

Emphasis on integration, theory and application of research on teaching of language arts and literature. Includes spelling, listening, written composition, linguistics, handwriting, usage and vocabulary. Focuses on child and adolescent literature which reflects our multiculture heritage. 1 seminar-discussion; 1 two-hour activity. Prerequisite: EDU 423.

EDU 425 Elementary Education: Mathematics (3)

Principles and methodology of teaching mathematics in the elementary school including instructional design, material selection and student assessment. 2 seminar-discussions; 1 two-hour activity. Prerequisite: EDU 423, Math 205, 206, 207 or equivalent or consent of Mathematics Department.

EDU 426 Elementary Education: Social Science (2)

Historical and contemporary social science theories influencing social studies elementary programs in the public schools. Analysis of social studies content and continuums. Effective social studies teaching utilizing a variety of resources, instructional strategies, and procedures. 1 seminar-discussion; 1 two-hour activity. Prerequisite: EDU 423.

EDU 427 Elementary Student Teaching I (9)

Supervised teaching in university-approved classrooms. The prospective teacher will experience initial teaching responsibilities in culturally diverse public school settings. Admission to student teaching required. May be repeated upon the advice of the Basic Credentials Coordinator. Concurrent enrollment in EDU 428 required.

EDU 428 Seminar: Elementary Student Teaching I (1)

Constructive analysis of problems and procedures of elementary student teaching experiences. Concurrent enrollment with EDU 427 required. 1 seminar-discussion.

EDU 429 Elementary Student Teaching II (9)

Supervised student teaching in university-approved schools. Concurrent enrollment in EDU 430 required. Prerequisite: Admission to student teaching and/or completion of EDU 427 and 428.

EDU 430 Seminar: Elementary Student Teaching II (1)

Synthesis of knowledge and experiences provided in the student teaching experiences of a prospective elementary teacher. Concurrent enrollment in EDU 429 required. 1 seminar-discussion.

EDU 431 Elementary Education: Science (2)

Principles and methodology of teaching science in the elementary school including instructional design, and analysis of science curriculum. Emphasis on effective teaching utilizing a variety of resources and instructional strategies. 1 seminar-discussion; 1 two-hour activity. Prerequisite: EDU 423.

EDU 432 Teaching Reading in the Content Area (4)

Presents diagnostic, remedial and developmental techniques for comprehension of content materials in single-subject classrooms. 3 seminar-discussions; 1 two-hour activity. Prerequisite: EDU 420 or 421.

EDU 433 Organizational and Instructional Methods for Secondary Classrooms (4)

Designed to familiarize prospective secondary teachers with practical application of educational theory and research to classroom instruction/organization. Lecture, demonstrations, and discussions supplemented by two hours of field observation or teaching experience per week. 3 seminar-discussions; 1 two-hour activity. Prerequisite: EDU 420 or 421.

EDU 434 Curriculum and Methods for Content Area Teachers (4)

Strategies and techniques for teaching a content area in the secondary schools. Objectives, curriculum, methods and materials used in teaching secondary education. Course will be taught by Single Subject Specialists. 3 seminar-discussions; 1 two-hour activity. Prerequisite: EDU 433.

EDU 435 Secondary Student Teaching I (9)

Supervised student teaching in university-approved classrooms. Admission to the Single Subject Credential Program required. May be repeated upon the advice of the Basic Credentials Coordinator. Concurrent enrollment with EDU 436 required.

EDU 436 Seminar: Secondary Student Teaching I (2)

Constructive analysis of problems and procedures of secondary student teaching experiences. Concurrent enrollment with EDU 435 required.

EDU 437 Secondary Student Teaching II (9)

Supervised teaching in university-approved schools. Concurrent enrollment in EDU 438 required. Prerequisite: Admission to student teaching and/or completion of EDU 435.

EDU 438 Seminar: Secondary Student Teaching II (2)

Synthesis of knowledge and experiences provided in the student teaching experiences of a prospective secondary teacher. Concurrent enrollment with EDU 437 required.

EDU 440 Technology Utilization in Teaching (4)

Explores the utilization and operation of various technologies in classroom teaching, technology as an extension of the teacher, related to instructional design and software selection for computers; video; instructional television; audio; moving and still images; and programmed instruction. 3 seminar-discussions; 1 three-hour laboratory.

EDU 450 Topics in Education (3)

Emphasis on discussion and analysis of selected topics in education. 3 lecture-discussions. May be repeated for a maximum of 9 units. Prerequisite: Consent of instructor.

EDU 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 School of Education class schedule for specific group emphasis each quarter. May be repeated for a total of 9 units. 3 lecture-discussions.

EDU 452 English as a Second Language (4)

Procedures and practices of second language acquisition techniques for elementary and secondary classrooms. 4 lecture-problem solving.

EDU 454 Exceptional Children and Youth (3)

An introduction to the understanding of children and youth classed as exceptional for educational purposes. 3 lecture-discussions.

EDU 455 Educational Computer Technology Science (3)

Introduction to and survey of the role of computers in education. Resources and curriculum implications for teachers. 3 lecture-problem solving.

EDU 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 lecture-discussions.

EDU 457 Photography and Perception (4)

Explanation of visual communication through the medium of photography. Production and analysis of visual forms; discussions on the encoding and decoding of expressions and impressions of photographic messages about individuals and social communities. 3 lecture-discussions; 1 three-hour laboratory.

EDU 458 Media Arts in Education (4)

Techniques and skills in Media/Art Education and its integration into the curriculum (science, social studies, reading, bilingual, and multicultural education). 3 lecture-discussions; 1 three-hour laboratory.

EDU 460 Practicum: Special Education (3–6)

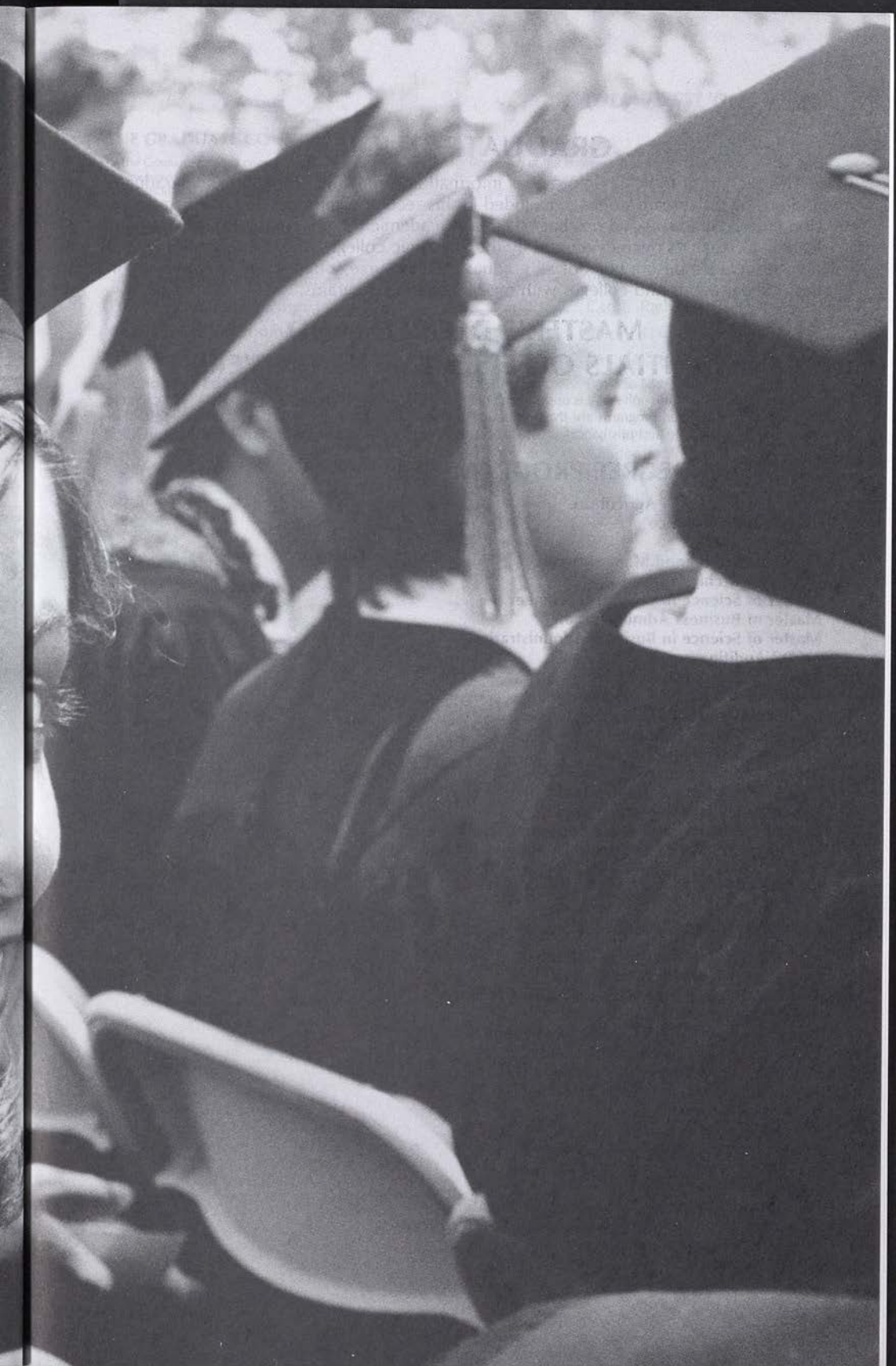
Supervised practice in assessment, instruction and program evaluation for exceptional children with various learning modalities and developmental levels. On-site experience with a variety of exceptional children and youth. 1 lecture-discussion; 1 four-hour activity.

EDU 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. Prerequisite: Permission of instructor.

Graduate courses are listed in the graduate section of the catalog.





GRADUATE STUDIES

This section of the catalog provides information to prospective, continuing graduate, and postbaccalaureate students. Included in this section is information regarding admission criteria, graduate and postbaccalaureate academic requirements, and the programs leading to master's degrees offered by the academic colleges and the School of Education. It includes descriptions of all graduate-level courses offered by the university in those departments and colleges 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 Associate Vice President for Academic Programs. The advanced programs are the product of the facilities of the academic colleges and the School of Education. The graduate and postbaccalaureate programs offered at the university are as follows:

MASTER'S DEGREE PROGRAM

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
- **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 and Regional Planning

SCHOOL OF EDUCATION

Credentials and Certificates

Multiple Subjects Teaching Credential
Single Subject Teaching Credential
Adaptive Physical Education Specialist Credential
Agriculture Specialist Credential
Bilingual/Cross Cultural Specialist Credential
Designated Subjects Credential
- **Business & Marketing Education**

Multiple Subjects Teaching Credential
- **Bilingual Emphasis**

Reading Specialist Credential
Special Education Specialist Credential
- **Learning Handicapped**
- **Severely Handicapped**

Educational Computer Technology Certificate
Educational Technology and Media Studies Certificate
Resource Specialist Certificate

THE GRADUATE COUNCIL

The Graduate Council consists of a representative of the faculty from each of the academic colleges and the School of Education and ex-offico members from appropriate areas of the university. The council is advisory to the Associate Vice President for Academic Programs in matters dealing with curriculum, graduate student affairs, graduate studies policy, and other areas related to the university's graduate and postbaccalaureate programs.

College of Agriculture	Melinda Burrill
College of Arts	George Eisen
College of Business Administration	Rhonda Rhodes
College of Engineering	Carl E. Rathmann
College of Environmental Design	Jeffrey K. Olson
College of Science	Pamela Sperry
School of Education	Jane S. McGraw
Associated Students	
Office of Academic Programs	Stanley J. Cook, Director, Academic Programs Carolyn H. Denham, Chair, Graduate Council Caryl Graham, Graduate Studies Analyst
University Library	Erik Ennerberg

Graduate and Postbaccalaureate Admissions

POSTBACCALAUREATE 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 $55 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.

A student who holds a baccalaureate degree from this university and plans to continue as a postbaccalaureate 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 a student must meet departmental admission criteria and is subject to the same enrollment quotas and application fees as are new applicants.

POSTBACCALAUREATE STANDING

For admission to 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 (4.0 A) in the last 90 quarter units (60 semester units) attempted; and

(c) have been in good standing at the last college attended.

All applicants seeking admission to postbaccalaureate study at this university must apply and be accepted in one of the following categories:

SECOND BACHELOR'S DEGREE (4000)

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. The cumulative grade point average of 2.00 (C) or above must be maintained.

GRADUATE STANDING. NON-CREDENTIAL. UNDECLARED (3100)

Students who are eligible for admission to a California State University campus in undeclared, noncertificate/credential graduate standing must state in their application that they do have graduate intentions in either a master's degree program or a credential program, though they have not entered such yet. A cumulative grade point average of 3.0 (B) must be maintained in upper-division and graduate courses. Admission to this status does not constitute admission to a graduate degree curriculum. A maximum of 13 units, 300 level or above, can be taken while in this classification.

GRADUATE STANDING. CREDENTIAL-CERTIFICATE. CONDITIONAL/UNCONDITIONAL (1000/7000)

Students who are eligible for admission to a California State University campus in undeclared graduate standing may be admitted to a particular postbaccalaureate credential or certificate program, provided that such professional, personal, scholastic, and other standards, including qualifying examinations, as may be required for the particular program, are satisfied. Until the application for classification is approved by the appropriate campus authority, the student's standing will be as a conditional certificate/credential student. A student who has been accepted in a certificate/credential program while an undergraduate at this university must apply for admission as a graduate student upon his/her attainment of undergraduate degree with an overall GPA of 2.75. A cumulative grade point average of at least 3.0 (B) must be maintained in upper-division and graduate courses. A maximum of 13 units, 300 level or above, may be taken in the conditional (1000) status.

MASTER'S DEGREE CANDIDATES. CONDITIONAL STATUS. (8000)

Students eligible for admission to a California State University campus in the undeclared, non-certificate/credential graduate status above, but who have deficiencies in prerequisite preparation that, 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 conditional master's degree standing. A cumulative grade point average of at least 3.0 (B) must be maintained in upper-division and graduate courses. Students in this status must complete deficiencies and file a GS-17 to obtain unconditional status. Graduation Writing Test requirements may/may not be satisfied.

MASTER'S DEGREE CANDIDATES. UNCONDITIONAL STATUS. (6000)

Students eligible for admission to a California State University campus in the undeclared or conditional master's degree standing may be admitted to an authorized master's degree curriculum of the campus as unconditional master's students if they satisfactorily meet the professional, personal, scholastic, or other standards for admission to the master's degree curriculum, including qualifying examinations required by appropriate campus authority. Only those applicants who show promise of success and fitness will be admitted to the master's degree curricula. Only those who continue to demonstrate a satisfactory level of scholastic competence with a 3.0 (B) grade point average or better shall be eligible to proceed in such curricula. Graduation Writing Test requirements may/may not be satisfied.

Limitations on Admissions

The admission of postbaccalaureate students lacking degree or credential objectives 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.

Re-enrollment of Continuing Postbaccalaureate Students

Whenever graduate students complete a degree objective and wish to continue taking course work at this university, they must submit a GS-17 form to the *Admissions Office.*

Former Students

Former students returning to the university after an absence of more than 2 quarters in a calendar 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 Studies Office **at least one year in advance of the quarter in which they seek admission** so that all required materials can be supplied.

TESTS AND EXAMINATIONS

TOEFL

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. The essay portion is mandatory in certain programs. 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 General Test of the Graduate Record Examination before admission.

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 Subject Test of the Graduate Record Examination in their subject matter areas. Other departments require a locally developed qualification examination. Admission generally will depend upon test scores. See the respective departmental sections of this catalog and the chart following.

REQUIRED ADMISSION TESTS

Program	GRE (Gen'l.)	GRE (Subj.)	GMAT
M.S. in Agriculture			
Master of Architecture			
M.S. in Biological Sci.			
Master of Bus. Adm.			X
M.S. in Bus. Adm.			X
M.S. in Chemistry			
M.S. in Computer Science		X [1]	
M.S. in Economics			
M.A. in Education			
Master of Engineering		X [2]	
M.A. in English			
Master of Land. Arch.			
M.S. in Mathematics			
M.S. in Phys. Educ.			
Master of Urban and Regional Planning	X [3]		

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 a written test. All persons who receive undergraduate, graduate, or external degrees from Cal Poly Pomona must pass the Graduation Writing Test (GWT).

A mandatory GWT registration policy requires that the test be taken by the quarter following the completion of 8 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/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 information bulletin, which is mailed to all new students. No graduate student will be advanced to candidacy until the requirement has been met.

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 101).

Students who have passed the GWT in undergraduate status at Cal Poly will not be required to take the test again when they change to graduate student status.

Students who did not pass the GWT in undergraduate status and had the test waived (either for continuous enrollment or by special consideration) in order to receive their bachelors degrees will be required to take AND pass the GWT before Advancement to Candidacy and a graduate degree may be awarded. The GWT cannot be waived for a second time. The waiver in undergraduate status applies only for the baccalaureate degree.

[1] Fifty percentile or better required

[2] Under 3.0 undergraduate G.P.A. in upper division courses in math, science, and engineering; or undergraduate degree from a non-ABET accredited curriculum.

[3] Under 3.0 undergraduate G.P.A.

GRADUATE AND POSTBACCALAUREATE 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 advisor 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 Associate Vice President for Academic Programs, and by the academic college dean, if required by college policy. Petition forms are available in department offices and the in the office of the Graduate Studies Analyst.

Students who wish to enroll in postgraduate 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 advisor at the appropriate department or school office. If the students bring their own copies of transcripts with them to the conference, the advisor can make specific suggestions, but the advisor 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 after Advancement to Candidacy. See "Advancement To Candidacy," P. 520.

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 fewer than 45 units in courses numbered 300 (400 for Engineering and Business Administration) 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. 300-level coursework may only be used with permission of the department.
2. A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.
3. For lower division course work (100-200 level at this university), no graduate credit will be given.
4. All 600–699 courses are open only to graduate students classified as unconditional.
5. At least 32 units of upper-division and graduate-level offerings must be completed in residence at this university.
6. Two-year master's degrees have higher unit requirements than specified above. See detailed information in the appropriate sections in this catalog.
7. A minimum of 3.0 (B) average must be earned in all graduate work taken at this university while in postbaccalaureate standing and in degree programs. No course with a grade lower than "C" (2.0) may apply toward the fulfillment of degree requirements. Once a graduate study contract has been established, courses may be moved to or from the contract by means of a properly approved graduate petition, except for the purpose of improving GPA.
8. A thesis, a project, or a comprehensive examination is required in all programs.
9. A favorable vote of the department, school, or center faculty is required before the degree may be conferred.
10. 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. The student must be enrolled in the university the quarter he/she graduates. 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.
11. The Graduation Writing Test requirement must be fulfilled before Advancement to Candidacy.

DEGREE PROGRAM

At the time students are admitted to a master's degree curriculum, they should arrange with the advisor to prepare an official program. If they are admitted as unconditional 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.*

Any contracts which are filed beyond that date will not be accepted without justification by the graduate coordinator. If the contract is accepted, units taken beyond the 13-unit requirement possibly may not be included on the contract.

Students who do not file graduate contracts prior to the completion of the 13-unit requirement may have a hold placed on their fee bill and may face administrative disenrollment from the program if they are not able to show cause for non-compliance with the contract regulation.

When the program has been approved by the Graduate Studies Analyst, a copy is sent to the student and to the advisor who has approved it. The original is retained by the Graduate Studies Analyst. A copy is sent to the Evaluations Office and is used as the official record of the student's progress toward the degree.

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 advisor or committee. In developing the program, the student and advisor will seek to plan a meaningful pattern of courses focused upon the objectives of the major and the student. If the student 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. Advisors 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 9 quarter units of credit for thesis or project may be included.
5. The master's degree program must be approved by the student's departmental advisor and verified by the Graduate Studies Analyst. The approved program is an official agreement between the institution and the student.
6. Graduate students may not file for "Credit by Examination."

ELECTION OF REQUIREMENTS

Regulations governing requirements for a master's degree become effective when unconditional graduate student status is achieved.

Graduate students remaining in continuous attendance may elect to meet the degree requirements in effect either at the time of their first course on the contract 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 unconditional graduate degree or credential students have second priority; conditional and undeclared graduate have third priority. Undeclared postbaccalaureate students are admitted on a space-available basis.

MAXIMUM UNIT LOAD

The normal maximum load for graduate students is 16 units (Architecture allows 18 units). Exceptions may be made by the advisor. A student must petition for permission to carry over 16 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. Graduate and postbaccalaureate students are considered as full-time for most purposes, such as veteran's benefits, when they are enrolled for 8 units.

ADVANCEMENT TO CANDIDACY

Some type of culminating experience is required for each master's degree. Acceptable culminating experiences include thesis, project or comprehensive examination. Individual departments permit the experience in one or more forms.

It is only upon the removal of all conditionals, having an approved contract on file, being in good academic standing (at least 3.0 GPA), completing all preparatory courses, and receiving a pass/waive on the GWT that the graduate student will be advanced to candidacy for his/her culminating experience for the master's degree.

THESIS OR PROJECT

If a thesis or project is included in the degree program, the candidate may register for 694 (MBA only) or 695 (project) or 696 (thesis) only with approval of the major professor. Before registration for thesis, the candidate shall confer with the thesis advisor and have a thesis committee and a tentative subject. Each candidate 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 candidate 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 candidate may not use university facilities or receive faculty assistance. When a candidate has failed to maintain resident status through non-enrollment or leave of absence after commencing a thesis or project, readmission to the program will require departmental approval. Since passing the final oral exam is a part of the completion of thesis in several disciplines, the graduate candidate must be enrolled the quarter the oral is taken.

A thesis or project in the official master's degree program will carry not fewer than 3 nor more than 9 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 (695) must be completed on the same time schedule but may have separate departmental rules for approval and submission.

The candidate 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 Studies Analyst. Further information is contained in the thesis instructional manual (GS-11) available from the Graduate Studies Analyst and in department offices.

The Cal Poly Kellogg Unit Foundation, Inc., has made available a loan fund for candidates 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 Aid Office.

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 some forms of plagiarism, the uses of purchased term papers and pirated computer software have been considered so serious that the state and federal governments have enacted laws providing for criminal penalties for use, sale or other distribution of such materials. Students are, therefore, cautioned against this and all other forms of plagiarism.

COMPREHENSIVE EXAMINATION

A comprehensive examination may be 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 candidate 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 candidate's master's degree program and of further registration in the department in which the candidate 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 advisor or the section of this catalog in which requirements for the degree field are given.

TIME LIMIT

The graduate degree program of not fewer than 45 units shall be completed within 7 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. Such certification must be placed in the student's permanent file.

GRADUATION CHECK FOR THE MASTER'S DEGREE

Before the end of the third week of the quarter preceding that in which a candidate expects to receive the master's degree, an application for graduation check must be completed at the Office of Evaluations. Written notification of status will be sent to the student by the Office of Evaluations usually about three weeks after application.

GRADUATION

Candidates must be enrolled in the university during the quarter in which they graduate.

An application for graduation must be filed at the Office of Evaluations no later than the date specified in the campus calendar. The graduation fee is paid at the Cashier's Office at that time. This fee includes the cost for a 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.

Academic Policies

SCHOLARSHIP REQUIREMENTS

Master's degree students, conditional or unconditional (8000/6000), and credential students, conditional or unconditional (1000/7000) will be subject to disqualification and may be disqualified from the university if their cumulative grade-point average falls below 3.0 (B) in upper-division and graduate courses after the second quarter of attendance.

Undeclared graduate students, noncertificate/noncredential, who have declared that they will be enrolling in either a master's degree program or a certificate/credential program, but have not entered such yet (3100), will be subject to disqualification and may be disqualified from the university if their cumulative grade-point average falls below 3.0 (B) in upper-division and graduate courses after the second quarter of attendance. Maximum of 13 units, 300 level or above, may be taken while in this classification. Graduate students may not use either the campus course repeat policy or academic renewal which apply only to undergraduate students.

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) the student has been advised of the consequences of failure to regain good standing.

Master's degree students and certificate/credential or 3100 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. Students may petition through their respective graduate coordinators and/or department chairs to the Associate Vice President for Academic Programs 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 in contract courses, with less than a 3.0 (B) average in graduate work at Cal Poly, 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 fewer than 6 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 (B) grade point average on completion of the revised master's degree program as outlined above, the program may 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.

While no student may fall below 3.0 in graduate contract coursework, students may find themselves in situations where their overall GPA is less than 3.0. Such students may petition to have this requirement waived if their graduate contract coursework is above 3.0. Such a waiver is not in violation of Title 5 of the California Code of Regulations.

A graduate petition is to be filed in the Office of Graduate Studies. In order to be accepted, such a petition must be reviewed and filed by the appropriate graduate coordinator and/or program director. The Associate Vice President for Academic Programs will consider each petition on an individual basis and will grant such approvals for deviation only after consultation with and approval by the appropriate graduate coordinator.

TRANSFER CREDIT

If accepted by the faculty of the discipline involved, graduate credit (up to 13 units) 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 (up to 13 units) 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). A limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a contract.

COURSES TAKEN BY UNDECLARED STUDENTS

Courses taken by a student while in undeclared, postbaccalaureate standing will be accepted in fulfillment of degree requirements only if the department and graduate advisor 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 unconditional status for an advanced degree. The student must declare his/her chosen program by the time 13 units, 300 or above, have been completed.

Colleges and departments shall deny enrollment in graduate-level courses to undeclared postbaccalaureate 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 a disqualified graduate student must have the approval of the graduate committee in the new department and the Associate Vice President for Academic Programs.

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

Examples of graduate changes are:

1. Changing from one major field to another for the master's degree.
2. Changing from a certificate/credential objective to a master's degree objective.
3. Changing from a master's degree objective to a certificate/credential objective.
4. Changing from no objective to some stated objective listed in this catalog.
5. Changing from conditional to unconditional objective.
6. Changing from certificate objective to credential objective.

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 student 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 Studies 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 to the Graduate Studies Office.

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 and the Graduate Studies Office.

GRADING SYSTEM (see undergraduate catalog section for complete definitions)

The university employs the following grading system for graduate courses:*

A—Superior work, representing effective representation, unusual competence, and high skill.
B—Very Good work, meeting full requirements for performance at the graduate level.
C—Adequate, meets minimum requirements of the course; acceptable for graduate credit, (2.0).
F—Unacceptable, 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	4.0 points	C+	2.3 points
A—	3.7 points	C	2.0 points
B+	3.3 points	I	0.0 points
B	3.0 points	F	0.0 points
B—	2.7 points	SP	0.0 points

When the grades of "C−", "D+", "D", or "D−" are assigned for upper-division undergraduaqte/graduate course work taken by a graduate or postbaccalaureate student, a grade of "F" will be recorded and neither the

* NOTE: Graduate courses are defined as any course taken by a student in postbaccalaureate standing.

credit, grade points, nor the content of that course shall apply to a degree. However, units attempted will affect the student's GPA.

The "SP" grade is approved for all university courses numbered 690–699. All "SP" symbols must be changed to letter grades within a one-year time-limit. The only exceptions are Project 695 and Thesis 696 which have two-year allowances. In any 600 level course, if not completed within the allotted time, the student must re-enroll to receive credit.

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 Associate Vice President for Academic Programs or the Associate Vice President for Student Affairs.

REPETITION OF COURSES

A graduate or postbaccalaureate student may not file a repeated course form, but may repeat a course if a grade of "C–" or less was assigned. Repeated grades will be averaged with other attempts.

ACADEMIC RENEWAL

Academic renewal is not available to graduate students.

RETROACTIVE WITHDRAWAL

See catalog p. 106 concerning retroactive withdrawal, which is available to graduate students.

AGRICULTURE

Master of Science in Agriculture

Agricultural Science Option

David C. Whaley, *Chair, Agricultural Business Management and Agricultural Education; Graduate Coordinator, M.S. in Agriculture, Agricultural Science Option*

Flint Freeman, *Coordinator, Agricultural Education*

The Master of Science in Agriculture, Agricultural Science option, provides the student the opportunity to enhance knowledge and competence in a selected area of specialization as well as encourages individual study and research. The attainment of a master's degree also permits the qualified candidate to pursue further specialized training, or gain entrance to professional schools. 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 of Science program in Agricultural Science must have a baccalaureate degree in agriculture. An undergraduate grade point average of 2.75 overall —OR— 2.75 in the last 90 units of coursework is required for unconditional admission. A 3.0 GPA is required if the student has completed 45 units of graduate credit towards a teaching credential or another graduate degree. In addition, the Graduate Coordinator 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 Graduate Coordinator. 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 by the end of second quarter based on the student's interests and preparation. The student's approved program will include required basic core courses, a selection of additional courses in a specialization, electives, independent study, and a thesis or comprehensive exam. The student must have on file an approved program within two quarters of admission to the master's program. Students electing to complete additional coursework and the comprehensive examination in lieu of the thesis must be agricultural education teachers.

Advancement to Candidacy

Admission to the program does not admit a student to candidacy for the degree. Advancement to Candidacy is contingent upon the recommendation of the Graduate Coordinator. A student who has not been admitted to candidacy is not eligible to register for the thesis (AG 696) or comprehensive examination (AG 697). In order to advance to candidacy for the Master of Science in Agriculture, Agricultural Science option, a student must: 1) complete at least 12 units of graduate coursework at Cal Poly with a GPA of 3.0 or better; 2) pass the Graduate Writing Test; and, 3) with the major professor and Graduate Coordinator, develop and file a program of study. The official program of study must be prepared and submitted for approval *no later than the end of the second quarter of attendance.*

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. Additional coursework may be required to eliminate subject matter deficiencies.
2. A grade point average of 3.0 (B) or better must be maintained in all upper division undergraduate and all graduate courses. No course with a grade lower than "C" (2.0) may apply toward the fulfillment of degree requirements.
3. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.
   A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.
4. 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 student must meet the requirements for unconditional admission into the master's program.
   b. Prior permission from the department Graduate Coordinator must have been obtained.
5. The student will develop a program based upon the curriculum outline that follows, in consultation with the major professor and the department Graduate Coordinator and be approved by the Graduate Studies Analyst.
6. A candidate completing thesis must submit two final copies for binding in accordance with university regulations and successfully complete a final oral examination covering the thesis and the candidate's area of specialization.
7. The candidate must be enrolled in the university during the quarter of graduation.

Curriculum

Required Courses

		Units
ABM 375	Data Management *AND*	4
ABM 476	Quantitative Analysis for Agriculture	4
	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 410	Technological Applications in Agricultural Education	3
AG 530	Program Planning & Development	3
AG 550	Seminar in Agriculture	3
AG 694	Thesis Research	1–6
	and	
AG 696	Master's Degree Thesis	1–6
	OR	
*AG 697	Comprehensive Exam	1
		21–32

Elective Courses

To be selected with consent of the student's major professor and graduate committee 13–24

Total 45

* Students electing this option will include 1–11 additional units of electives in their program in lieu of AG 694 (1–6) and AG 696 (1–6). Note qualifications for this option listed under admission to the program.

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 lecture-discussions; 1 two-hour activity.

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 lecture-problem solving.

AG 540 Evaluation of Ag-Ed Programs (3)

Evaluation of Ag-Ed departments. Emphasis given to a well-balanced program providing instruction, supervised occupational experience, and youth activity. 3 lecture-problem solving.

AG 550 Seminar in Agriculture (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. AG 450 may be substituted for AG 550 by those individuals who have completed the Agricultural Specialist Credential. AG 450 may not be used to meet the 500–600 course level requirement. 3 seminar-discussions. Prerequisite: Consent of instructor.

AG 560 Internship (1–3)

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. Students are permitted to take only 1–3 units per quarter.

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). 3 seminar-discussions.

AG 591 Directed Study (1–2)

Individualized study, research, or readings in a specialized area under the direction of a faculty member. May be repeated for a maximum of 4 units. Students are permitted to take only 1–2 units per quarter.

AG 599 Special Topics for Graduate Students (1–4)

Group study of selected topics, the title to be specified in advance. Instruction by lecture, laboratory or a combination of both. Prerequisite: Permission of major professor and graduate committee.

AG 692 Independent Study (1–2)

Individualized study, research, or readings in a specialized area proposed by the student and conducted under the direction of a faculty member. May be repeated for a maximum of 4 units. Students are permitted to take only 1–2 units per quarter. Unconditional standing required.

AG 694 Thesis Research (1–3)

Research conducted in area of specialization under the direction of a faculty member as part of the preparation for writing a thesis. May be repeated for a maximum of 6 units. Students are permitted to take only 1–3 units per quarter. Unconditional standing required.

AG 696 Master's Degree Thesis (1–3)

Compilation, evaluation, interpretation, and presentation in thesis form of supervised research. May be repeated for a maximum of 6 units. Students are permitted to take only 1–3 units per quarter. Advancement to Candidacy required.

AG 697 Comprehensive Examination (1) (Credit/No credit)

Preparation for and completion of the written comprehensive examination. Advancement to Candidacy required.

AG 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the "SP" grade until the completion of the thesis or comprehensive examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

Master of Science in Agriculture

Animal Science Option
in the Department of Animal Science, College 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/her 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 student to research techniques and the use of scientific literature, and to prepare him/her 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 allows an internship through which the student may complement 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 of Science 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 upper division coursework 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 to the master's program.

The student along with an appointed advisory committee will develop a program by the end of the second quarter in a selected area of animal science based on the student's interest and preparation. The student's approved program will include required basic core courses, a selection of additional courses in a specialization, electives, independent study, and a thesis.

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is required for registration in AS 696 and the awarding of the M. S. degree. In order to advance to candidacy for the Master of Science in Agriculture with the Animal Science option, a student must: 1.) pass the Graduation Writing Test or have it waived; 2.) achieve a GPA of 3.0 (B) or better for at least 35 contract units.

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. 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. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.
   A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.
4. Achieve Advancement to Candidacy.
5. A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate courses.
6. The candidate must complete a formal thesis and submit at least two final copies for binding in accordance with university regulations.
7. A final oral examination covering the thesis and the candidate's area of specialization must be successfully completed.
8. The candidate must be enrolled in the university during the quarter of graduation.

CURRICULUM

Required Courses

	Units
Design and Analysis of Experimental Research (AS 545)	4
Animal Science Seminar (AS 598)	1–3
Thesis Research (AS 694)	3–9
Master's Degree 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. 4 lecture-discussions. Prerequisites: Non-ruminant 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. 3 lecture-discussions. Prerequisites: 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. 4 lecture-discussions. Prerequisite: Course in statistics.

AS 547 Advanced Meat Science (3)

Microstructure and chemistry of skeletal 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. 3 lecture-discussions. Prerequisites: AS 427 and 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. May be repeated for a maximum of 4 units. Prerequisite: Consent of internship coordinator.

AS 598 Animal Science Seminar (1)

Study of selected topics in animal science. 1 seminar-discussion. Total credit limited to 3 units. Prerequisite: Consent of instructor.

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. Instruction is by lecture, laboratory or a combination of both. Prerequisite: Permission of major professor and graduate committee.

AS 691 Directed Study (1)

Individual research in a specialized area, directed by a faculty member. Work does not pertain directly to the thesis. May be repeated. Maximum credit 4 units. Unconditional standing required.

AS 692 Independent Study (1)

Research proposed by the student, conducted under the supervision of a faculty member. Work does not pertain directly to the thesis. May be repeated. Maximum credit 4 units. Unconditional standing required.

AS 694 Thesis Research (1–3)

Individual research pertaining directly to the thesis, under the supervision of the major professor. May be repeated. Maximum credit 9 units. Unconditional standing required.

AS 696 Master's Degree Thesis (1–3)

Compilation of data culminating in the summarizing and reporting, in approved thesis form, of independent supervised research. Total credit limited to 3 units. Prerequisite or concurrent: AS 694. Advancement to Candidacy required.

AS 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

AGRICULTURE

MASTER OF SCIENCE IN AGRICULTURE

Nutrition and Food Management Option in the Department of Foods and Nutrition and Home Economics

Bonnita Farmer, *Department Chair*

Kara Caldwell-Freeman, *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, or 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 of Science 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 courses in foods and nutrition and 12 units in closely related areas such as biochemistry, physiology, or bacteriology, to be admitted as an unconditional 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 meet the requirements for unconditional admission within two quarters of their acceptance into the master's program.

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is required for registration in FN 696, Thesis and awarding of the master's degree. In order to advance to candidacy for the Master of Science in Agriculture, Nutrition and Food Management option, the student must 1. pass the Graduate Writing Test; 2. achieve a GPA of 3.0 or better for at least 30 contract units; 3. satisfactorily complete comprehensive oral and written examinations.

The student along with an appointed advisory committee will develop a program by the end of second quarter in a selected area of nutrition and food management based on the student's interest and preparation. The student's approved program will include required core courses, a selection of additional courses in a specialization, electives and a thesis.

The Department of Foods and Nutrition and Home Economics offers a postbaccalaureate Preprofessional Practice Program (AP4) which is currently approved by the American Dietetic Association. Upon completion of this program, students are eligible to take the examination to become a registered dietitian.

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. 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. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.
   A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.
4. A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate courses.
5. A candidate must achieve Advancement to Candidacy.
6. The candidate must complete a formal thesis. The thesis must be presented and defended no later than the third week of the quarter in which the candidate expects to graduate. Two copies must be submitted for binding in accordance with university regulations.
7. A final oral examination covering the thesis must be successfully completed.
8. The candidate must be enrolled in the university during the quarter of graduation.

CURRICULUM

Required Courses	*Units*
ABM 575 Statistics for Agriculture	4

FN 520	Food Chemistry and Toxicology	3
FN 533	Advanced Nutrition	3
FN 538	Research Methods in Nutrition	2
FN 570	Seminar	2–4
FN 694	Research	1–9
FN 696	Master's Degree Thesis	3
		20–28

Nutrition and Food Management Specialization courses to be selected with consent of the student's major professor and thesis committee 17–25

Graduate Course Descriptions

FN 520 Food Chemistry and Toxicology (3)

Advances in the chemistry of food materials. Toxicological procedures and data relating to food additives. Nutrient-drug interaction. Presentation, evaluation, and discussion of bibliographic assignments. 3 seminar-discussions. Prerequisite: FN 420 or equivalent.

FN 533 Advanced Nutrition (3)

Coordination of structure and function related to metabolic needs of specialized cells and their environmental response. Interrelationship of metabolism, physiological roles and nutrition. Comprehensive study of control of food intake. Oral presentation and evaluation of current studies in nutrition. 3 seminar-discussions. Prerequisites: FN 433, 434 or equivalent.

FN 535 Recent Advances in Nutrient Metabolism (2–3)

Recent developments and research in nutrient metabolism to be presented and discussed. 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 seminar-discussions. Maximum of 9 units may be earned. Prerequisites: FN 433, 434, and 435 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. Oral presentation and discussion of special nutritional problems of the life cycle. 3 seminar-discussions. 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-discussion, 1 three-hour laboratory. Prerequisites: FN 433, 445, and ABM 476 or ABM 575 or consent of instructor.

FN 540 Field Experience (2)

Supervised experience in various areas determined by graduate advisor. Prerequisite: Consent of advisor.

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. 3 lecture-discussions. 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. 2 lecture-discussions, 1 three-hour laboratory. Prerequisite: FN 445 or equivalent.

FN 550 Independent Study (2–6)

Individual investigation and original study to be conducted in a field of interest selected by the student with consent of advisor. Designed to meet individual student needs. Maximum of 9 units may be earned.

FN 560 Clinical Experience (3–9)

Independent clinical experience in an area chosen by the student under the supervision and direction of a graduate faculty member. Maximum of 9 units may be earned. Prerequisite: Consent of instructor.

FN 570 Seminar (2–4)

Study of selected topics in foods and nutrition. Each seminar subtitled to describe its emphasis. Total credit limited to 4 units. 2–4 seminar-discussions. Prerequisite: Consent of instructor.

FN 691 Directed Study (1–4)

Individualized research in a specialized area under the direction of a faculty member which may or may not lead to a thesis. Maximum credit 4 units. Unconditional standing required.

FN 692 Independent Study (1–6)

Individual investigation and original study to be conducted in a field of interest selected by the student under the supervision of a faculty member. Study may not lead to a thesis. Maximum credit 9 units. Unconditional standing required.

FN 694 Thesis Research (1–9)

Individual research in an area of specialization conducted as part of the preparation for writing a thesis under the direction of graduate faculty. Maximum credit 9 units. Unconditional standing required.

FN 696 Master's Degree Thesis (3)

Compilation of data culminating in the summarizing and reporting, in thesis form, of independent supervised research. Maximum credit 3 units. Advancement to Candidacy required.

FN 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

AGRICULTURE

CAREER MBA

Agribusiness Emphasis

A joint program in the College of Business Administration and the Agricultural Business Management and Agricultural Education Department, College of Agriculture

Marvin L. Klein, Ph.D., *Graduate Program Advisor*

The Agribusiness emphasis in the Career MBA program is designed to prepare students for careers in the dynamic and rapidly changing agricultural and food system. Graduates of agricultural disciplines, business schools, and the social sciences will benefit from this program. By combining the broad based skills provided in the MBA program with the more specialized knowledge of the domestic and world agricultural and food system, graduates will be prepared to accept challenging and exciting positions in the food and fiber industries. The program stresses the areas of agribusiness marketing, commodities and risk management, international agribusiness marketing, and the environment of the agribusiness firm.

Admission to the program

An applicant for admission to the Agribusiness emphasis in the Career MBA program must meet the requirements for admission to the MBA program. 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. (See Business Administration, Admission to the Program and Requirements.)

CURRICULUM

Agribusiness Emphasis

First year (See Graduate Program Advisor)

Career MBA core:		Units
EC 521	Business Economics	4
GBA 551	Cost Determination and Analysis	4
GBA 561	Seminar in Organizational Behavior	4
GBA 564	Management Science	4
GBA 646	Advanced Financial Management	4

Required Courses

ABM 505	Commodities and Risk Management	4
Choose four electives units from the following seminar courses		
GBA 643	Management Information Systems	4
or GBA 652	Marketing Seminar	
or GBA 671	Management Seminar	
Directed elective courses:		
ABM 501	Environment of Agribusiness Firm	4
ABM 504	Agribusiness Marketing	4
ABM 530	Int'l Agribus. Mktg and Develop.	4
Capstone course:		
GBA 691	Directed Study in Business, AND	4
GBA 695	Business Research Project	4
		48

GRADUATE COURSE DESCRIPTIONS

(See MBA—College of Business Administration for GBA course descriptions)

ABM 501 Environment of the Agribusiness Firm (4)

Overview of macroeconomic and environmental factors influencing agribusiness management. Critical evaluation of U.S. and E.C. domestic and foreign trade policies. Investigate the impacts of social and economic trends on the agribusiness firm. Methodologies for evaluating the external environment will be presented. Lecture-discussion, 4 hours. Prerequisite: Consent of instructor.

ABM 504 Agribusiness Marketing (4)

Analysis of agricultural marketing structures and practices. Discussion of managerial approaches to conventional agricultural marketing. Critical examination of revolutionary changes that are moving the system out of atomistic free competition toward monopolistic or oligopolistic competition. Lecture-discussion, 4 hours. Prerequisite: ABM 501 or consent of instructor.

ABM 505 Commodities and Risk Management (4)

Fundamentals of temporal price fluctuations, and risk management strategies through forecasting, futures markets, and options. Econometric and time series modeling of commodity prices will be presented. Lecture-discussion, 4 hours. Prerequisites: ABM 501; ABM 305 or ABM 504 or FRL 432 or consent of instructor.

ABM 530 International Agribusiness Marketing and Development (4)

Theoretical and conceptual framework of international agribusiness marketing. Major topics include the basic characteristics of the world market environment, trade regulations in agriculture, and marketing institutions for agricultural products. Lecture-discussion, 4 hours. Prerequisite: ABM 501 or consent of instructor.

ARCHITECTURE

MASTER OF ARCHITECTURE

In the Department of Architecture, College of Environmental Design

Barry L. Wasserman, *Chair*

Sigrid Miller Pollin, *Graduate Coordinator*

The Department of Architecture offers a program of study which leads to the degree, Master of Architecture. Students from varied academic backgrounds, including non-design disciplines, 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 60 quarter units of academic work must be completed in this program prior to receiving the Master of Architecture degree. Research in either theory or social responsibility in architecture will culminate in a thesis/project. The Institute for Environmental Design provides the means for interdisciplinary study of environmental design issues. Please refer to the undergraduate section for information on this program. It is possible to arrange an area of concentration through the Departments of Urban and Regional Planning or Landscape Architecture in the College of Environmental Design or through the College 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 end 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, two 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 these courses are prerequisites to the study of structures and environmental controls. A graphics course is also recommended as preparation for the design sequence. 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 graduate program. Normally, two years and one quarter of study in this program would lead to the Master of Architecture degree.

Prior to graduation all students are required to fulfill a minimum of 500 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 requirement is waived for students holding a Bachelor of Architecture from California State 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 and have attained an overall undergraduate grade point average of at least 2.80. An applicant who does not meet these criteria may be admitted on a conditional 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 and official transcripts of all college work which must be submitted to the university Admissions Office, the Department of Architecture requires the following:

1) Portfolio (no larger than 11" × 14") illustrating creative or analytic ability in written, graphic, or mathematical form;
2) Statement of purpose or intentions in applying to the program; and
3) Three letters of recommendation from those 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. January 15 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 Master of Architecture, Second Professional Degree program a minimum of 60 quarter units must be completed. In this program no more than 24 units of 400 level work will be accepted. In the Master of Architecture, First Professional Degree program as many as 160 quarter units may be required. No work below the 300 level will be accepted in either program.
2. All course work must be completed in residency, unless consent is granted by the Graduate Studies Committee for each off-campus course. Title 5 of the California Code of Regulations requires a minimum of 32 units of coursework in residence.
3. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.
   A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.
4. 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.
5. 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 and file a petition in the Records Office.
6. Advancement to Candidacy must be achieved. The Graduation Writing Test (GWT) must be passed prior to advancement.
7. A final project/thesis is required of candidates in both the First and Second Professional Degree programs. The candidate will be required to pursue an interest in theory or social responsibility in architecture. The candidate must submit a written proposal and file a petition outlining the goals, procedures and intentions of his/her 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 candidate's project advisors, must also receive copies of the proposal.
8. Credit will not be awarded for the same course in both the baccalaureate and master's programs in architecture.
9. All class work becomes the property of the department with superior work retained for display and archival use.
10. The candidate must be enrolled in the university during the quarter of graduation.

PROGRAM FOR THE MASTER OF ARCHITECTURE I

(First Professional Degree)

PREREQUISITE COURSES

Normally met by students who hold the Bachelor of Architecture Degree

College Algebra	MAT	105	*
Trigonometry	MAT	106	*
College Physics	PHY	121, 141	*

* 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.

Structures	ARC	321	4
Structures	ARC	322	4
Structures	ARC	323	4
Environmental Controls	ARC	331	4
Environmental Controls	ARC	332	4
Solar Design	ARC	334	4
Building Construction	ARC	341	4
Ancient and Medieval Architecture	ARC	361	4
Renaissance and Baroque Architecture	ARC	362	4
Nineteenth and Twentieth Century Architecture	ARC	363	4
Architectural Practice	ARC	471	4
or Business Development in Architecture	ARC	476	4
Architecture and Computers	ARC	474	4
Behavioral Factors in Architecture	ARC	481	4
Introduction to Architectural Design	ARC	501	6
Introduction to Architectural Design	ARC	502	6
Intermediate Architectural Design	ARC	503	6
Architectural Design	ARC	504	6
Architectural Design	ARC	505	6
Architectural Design	ARC	506	6
Architectural Graphics	ARC	512	2
Approved Electives			10
TOTAL PREREQUISITE UNITS			100

FINAL YEAR PROGRAM

Seismic Design	ARC	424	4
American Architecture	ARC	464	4
Advanced Architectural Design	ARC	601	6
Advanced Architectural Design	ARC	602	6
Social Responsibility in Architecture	ARC	652	
or Theory and Literature of Architecture	ARC	653	4
Directed Study	ARC	691	4
Project/Thesis Research	ARC	694	4
Master's Project	ARC	695	

or Master's Thesis	ARC	696	8
Landscape Architecture Elective	LA		3-4
Urban and Regional Planning Elective	URP		3-4
Professional Electives			12-14
TOTAL FINAL YEAR UNITS			60
TOTAL UNITS OF MASTER OF ARCHITECTURE I (First Professional Degree)			160

PROGRAM FOR THE MASTER OF ARCHITECTURE II

(Second Professional Degree)

Seismic Design	ARC	424	4
American Architecture	ARC	464	4
Advanced Architectural Design	ARC	601	6
Advanced Artchitectural Design	ARC	602	6
Social Responsibility in Architecture	ARC	652	
or Theory and Literature of Architecture	ARC	653	4
Directed Study	ARC	691	4
Project/Thesis Research	ARC	694	4
Master's Project	ARC	695	
or Master's Thesis	ARC	696	8
Landscape Architecture Elective	LA		3-4
Urban and Regional Planning Elective	URP		3-4
Professional Electives			12-14
TOTAL UNITS FOR MASTER OF ARCHITECTURE II (Second Professional Degree)			60

PROFESSIONAL ELECTIVE COURSES

Advanced Structures	ARC	425	4
Advanced Structures	ARC	426	4
Contemporary Architecture	ARC	465	4
Japanese Architecture	ARC	466	4
California Architecture	ARC	467	4
The Architect and the Development Process	ARC	473	4
Computer Aided Design in Architecture	ARC	475	4
Behavioral Factors in Architecture	ARC	482	4
Behavioral Factors in Architecture	ARC	483	4
Topics in Design History	ARC	567	4
Directed Study	ARC	591	2-4
Directed Study	ARC	592	2-8

Other electives must receive prior approval of the Graduate Coordinator.

Graduate Course Descriptions

NOTE: For graduate prerequisites course descriptions, see undergraduate section.

ARC 501 Introduction to Architectural Design (6)

Introduction to the elements of architecture and application of architectural elements to the design of simple buildings. Emphasis on basic design, graphic communication skills and model making. For Master of Architecture students only. 3 lecture-discussions; 3 three-hour laboratories. Prerequisite: Matriculation into the Master of Architecture program.

ARC 502 Introduction to Architectural Design (6)

Study of general aspects of ecological, human, aesthetic and technological factors as architectural design determinants. Introduction to programming. 3 lecture-discussions; 3 three-hour laboratories. Prerequisite: ARC 501.

ARC 503 Intermediate Architectural Design (6)

Procedures and methods related to architectural design application. Emphasis on the thorough design and design development of a program or programs and includes design detailing and preliminary working drawings. 3 lecture-discussions; 3 three-hour laboratories. Prerequisite: ARC 502.

ARC 504 Architectural Design (6)

The design of single buildings of moderate programmatic complexity, emphasizing a concern for aesthetic, behavioral, and social issues. (May be repeated as an addition to the course of study.) 3 lecture-discussions; 3 three-hour laboratories. Prerequisite: ARC 503.

ARC 505 Architectural Design (6)

Design of complexes of buildings, with an emphasis on issues of context. (May be repeated as an addition to the course of study). 3 lecture-discussions; 3 three-hour laboratories. Prerequisite: ARC 504.

ARC 506 Architectural Design (6)

The design of complex buildings with an emphasis on the inclusion of structural, mechanical, environmental and energy conserving systems. The final week of the course is reserved for completion of a comprehensive design examination. (May be repeated as an addition to the course of study). 3 lecture-discussions; 3 three-hour laboratories. Prerequisite: ARC 505.

ARC 512 Architectural Graphics (2)

Basics of architectural graphics including analytic, conceptual and presentation drawings, drafting, and lettering. This is a prerequisite course, but may be repeated for up to 4 additional units as an elective. 1 lecture-discussion; 1 three-hour laboratory.

ARC 567 Topics in Design History (4)

Non-chronological investigations of the elements, typologies, methods and context of architecture; comparisons of historic and contemporary designs. 2 two-hour lecture-discussions. Prerequisite: ARC 363 or ARC 464 or consent of instructor.

ARC 591 Directed Study (2–4)

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 Advanced Architectural Design (6)

Advanced study of interaction of design methods, user needs, and site constraints explored in design projects. 3 lecture-discussions; 3 three-hour laboratories. Prerequisite: Matriculation into the Master of Architecture Program II or ARC 506 and passage of a comprehensive design examination. Unconditional standing required.

ARC 602 Advanced Architectural Design (6)

Advanced explorations in the theory and production of architectural design. 3 lecture-discussions; 3 three-hour laboratories. Prerequisite: ARC 601. Unconditional standing required.

ARC 652 Social Responsibility in Architecture (4)

Examination of the social context of buildings and architecture, beyond the limited functional and economic needs of clients; the implicit responsibility of buildings and architects to broaden environmental issues, as well as social needs. 2 two-hour seminars. Prerequisite: Admission to the final year of the Master of Architecture program. Unconditional standing required.

ARC 653 Theory and Literature of Architecture (4)

Explorations into the polemics, methodologies, and ideals of architecture through a review of its literature; emphasis on texts significant to contemporary practice. 2 two-hour seminars. Prerequisite: Admission to the final year of the Master of Architecture program. Unconditional standing required.

ARC 691 Directed Study (4)

Identification, supporting research, and development of master's project/thesis proposal. Seminar, 4 hours. Prerequisite: Admission to ARC 601. Unconditional standing required.

ARC 694 Project/Thesis Research (4)

Research and programming in support of student's master's project/thesis. Seminar, 4 hours. Prerequisites: ARC 601, ARC 691 and prior approval of the project/thesis topic by the Graduate Studies Committee. Unconditional standing required.

ARC 695 Master's Degree Project (8)

Independent and complete design project derived from the work developed in ARC 691 and 694; design development and presentation. Prerequisites: ARC 602, ARC 652 or 653, and ARC 694. Advancement to Candidacy required.

ARC 696 Master's Degree Thesis (8)

Independent written thesis project derived from the work of ARC 691 and 694 culminating in a formal presentation and defense. Prerequisites: ARC 602, ARC 652 or 653, and ARC 694. Advancement to Candidacy required.

ARC 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of project or thesis. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

BIOLOGICAL SCIENCES

MASTER OF SCIENCE IN BIOLOGICAL SCIENCES

In the Department of Biological Sciences, College of Science

Edward K. Mercer, *Chair*

Departmental Graduate Committee

Pamela J. Sperry, *Chair, Biology*
J. Curtis Clark, *Botany*
John K. Chan, *Microbiology*
Ronald D. Quinn, *Biology*
Jonathan N. Baskin, *Zoology*

The Master of Science degree program in the Biological Sciences will enhance the knowledge and competence of the student 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 is required for conditional admission and a 3.0 (B) average in all upper division work is required for unconditional 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 unconditional graduate student with an advisory committee will develop a program in a 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; at least 24 units must be in 500–600 level courses.
2. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.
   A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.
3. The student must complete the program based upon the curriculum outlined below.
4. A grade point average of 3.0 (B) or better must maintained in all upperdivision undergraduate and all graduate classes.
5. The Graduation Writing Test (GWT) must be passed prior to Advancement to Candidacy.
6. Advancement to Candidacy must be achieved which includes a score of fifty percentile or higher on the Biology section of the Graduate Record Exam and completion of BIO 693.
7. An exceptable thesis must be completed and 4 final copies submitted for binding in accordance with university regulations.
8. A final oral examination must be successfully completed.
9. The candidate must be enrolled in the university during the quarter of graduation.

Curriculum

Required Courses

	Units
Seminar in Biology (BIO 680)	3
Presentation of Research Proposal (BIO 693)	1
Thesis Research in Biological Sciences (BIO 694)	6
Master's Degree Thesis (BIO 696)	3
	13

Courses in a Specialization

To be selected with consent of the student's thesis committee from 500 and 600-level courses, 32-37 units including not more than 21 units of approved 400-level courses.

Total 45-50

Graduate Course Descriptions

BIO 500 Training in Graduate Research (1–3) FWSpSu

Advanced training in laboratory and analytical techniques under the supervision of a faculty member. Students must register through Dept. office. *Staff.* Open to postbaccalaureate students.

BIO 510 Cytogenetics (3) F

Nuclear and cytoplasmic structures and phenomena as related to inheritance. 2 lecture-discussions; 1 three-hour laboratory. Prerequisite: BIO 303. *Campbell.*

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. Recommended background courses are: BIO 306, BIO 530, and BOT 343. *Clark.* 3 lecture-discussions; 1 three-hour laboratory. Prerequisites: BIO 213, BIO 303 and BIO 325 or consent of instructor.

BIO 520 Endocrinology (4) Sp

Study of the endocrine glands and their role in growth development, metabolic regulation, and reproduction in animals. 3 lecture-discussions; 1 three-hour laboratory. Prerequisites: CHM 327 and ZOO 424 and/or consent of instructor. *Stiffler.*

BIO 521 Renal Physiology (3) W Odd-Numbered Years

Elements of epithelial transport function with special reference to the kidney. Current research on renal function will be stressed. 3 lecture-discussions. Prerequisite: ZOO 424. *Stiffler.*

BIO 522 Structure and Function in Insects (5)

Comparative functional morphology of insects; aspects of insect physiology. 3 lecture-discussions; 2 three-hour laboratories. Prerequisites: ZOO 426 or the equivalent and junior standing. *Edmonds.*

BIO 523 Immature Insects (3)

Study of the development, biology and classification of immature insects. 1 lecture-discussion; 2 three-hour laboratories. Prerequisite: ZOO 426 or the equivalent. *Edmonds.*

BIO 524 Insect Ecology (3) F

Principles of ecology as they apply to insects and other invertebrates. 3 lecture-discussions. Prerequisites: ZOO 426 or the equivalent, and BIO 325. *Force.*

BIO 525 Ecology of Fungi (4) Sp Odd-Numbered Years

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. 2 lecture-discussions; 2 three-hour laboratories. Prerequisites: BOT 425 and BOT 426; BIO 325 or BOT 421 recommended; or consent of instructor. *Stoner.*

BIO 526 Insect Classification (4)

Aspects of taxonomic procedure and study of classifications of the Class Insecta. Collection, identification and recognition of significant insect families. 2 lecture-discussions; 2 three-hour laboratories. Prerequisite: ZOO 426 or the equivalent. *Edmonds*

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 lecture-discussions; 1 three-hour laboratory. Prerequisites: BIO 325 and 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 lecture-discussions. Prerequisite: BIO 325. *Moriarty.*

BIO 530 Mechanisms of Speciation (3) W Odd-Numbered Years

Principles and concepts of evolutionary mechanisms in plants and animals. 3 lecture-discussions. Prerequisites: BIO 213, BIO 303, and BIO 325. *Edmonds.*

BIO 534 Water Pollution Biology (5)

Effects of pollution on aquatic organisms. Emphasis on experimental investigation in laboratory and field. 3 lecture-discussions; 2 three-hour laboratories. Prerequisite: Consent of instructor. *Staff.*

BIO 535 Advanced Cell Biology (4) W Even-Numbered Years

Molecular, ultrastructural and functional approach to cell biology. 4 lecture-discussions. Prerequisites: Bio 435 and CHM 327, or consent of instructor. *Wu, Troncale.*

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. 3 lecture-discussions. Prerequisites: BIO 213 and BIO 325. *Staff.*

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 Odd-Numbered Years

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. 3 lecture-discussions; 1 three-hour laboratory. Prerequisites: BOT 223, BOT 422, and CHM 227. *Stoner.*

BIO 548 Advanced Plant Physiology (4) Sp Odd-Numbered Years

Selected major aspects of plant water relations, metabolism, and growth. Emphasis on experimental investigations. 2 lecture-discussions; 2 three-hour laboratories. Prerequisite: BOT 422. *Blakely.*

BIO 550 Plant Growth and Development (4) Sp Even-Numbered Years

Hormonal and environmental control of plant morphogenesis. 2 lecture-discussions; 2 three-hour laboratories. Prerequisite: BOT 422. *Blakely.*

BIO 555 Molecular Biology of Development (4) 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. 4 lecture-discussions. Prerequisite: Consent of instructor. *Sperry, Troncale.*

BIO 560 Bacterial Physiology (4)

Physiological characteristics of bacteria with emphasis upon growth, biosynthetic capabilities and regulation of enzyme formation and function. 3 lecture-discussion; 1 three-hour laboratory. Prerequisites: MIC 300 and CHM 327. *Staff.*

BIO 565 Animal Tissue Culture (4) F

Principles, basic methodology, and special applications of animal cell culture. 2 lecture-discussions; 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 lecture-discussions; 1 three-hour laboratory. Prerequisite: MIC 415. *Adler.*

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. 2 lecture-discussions. *Staff.* *(See note at bottom of page at the end of this section).*

BIO 576 Advanced Immunology (3) W

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. 2 lecture-discussions; 1 three-hour laboratory. Prerequisite: MIC 415. *Staff.*

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. 2 lecture-discussions; laboratory, 9 hours by arrangement. Prerequisite: BIO 423 or consent of instructor. *Campbell.*

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. 2 lecture-discussions; laboratory, 9 hours by arrangement. Prerequisite: BIO 423 or consent of instructor. *Campbell.*

BIO 579 Recent Advances in Ultrastructure Research (3) W

Current developments in major fields of ultrastructure research. 3 lecture-discussions. Prerequisite: Consent of instructor. *Campbell.*

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. Total credit limited to 9 units. 3 lecture-discussions. *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 per quarter, maximum of 9 units. *Staff.* Unconditional standing required.

BIO 691 Directed Study (1–3) FWSpSu

Individual research in a specialized area on an advanced topic under the direction of a graduate faculty member. May or may not lead to a thesis. Students must register through the Dept. office. *Graduate faculty.* Unconditional standing required.

BIO 692 Independent Study (1–3) FWSpSu

Study, research, or readings proposed by the student with the consultation and approval, and under the supervision of a faculty member, but not leading to a thesis/project. Students must register through the Dept. office. *Graduate faculty.* Unconditional standing required.

BIO 693 Presentation of Research Proposal (1) Credit/No Credit

A public oral presentation and discussion of a proposed research plan for the Master's Thesis. Required for Advancement to Candidacy. *Graduate Faculty.* Unconditional standing required.

BIO 694 Thesis Research in the Bioligical Sciences (1–3) FWSpSu

Selection and completion of an experimental research project under the supervision of a graduate faculty member which leads to new knowledge as part of the preparation for writing a thesis. Total credit limited to 6 units, but may be taken for more. *Graduate faculty.* Unconditional standing required.

BIO 696 Master's Degree Thesis (1–3) FWSpSu

Compilation, evaluation, interpretation, and report of research for thesis directed by a committee of graduate faculty members. Completion of approved, bound thesis. Total credit limited to 3 units, but may be taken for more. Prerequisite: BIO 694. *Graduate faculty.* Advancement to Candidacy required.

BIO 697 Comprehensive Examination in Biology (1) Credit/No Credit

An examination of the subject areas of the candidate's breadth and technical speciality coursework listed on the contract of study. *Graduate Committee.* Advancement to Candidacy required.

BIO 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

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
Paleobiology & Macroevolution
Plant Speciation
Radiation Exposure

BUSINESS ADMINISTRATION

Graduate Business Administration Programs

In the College of Business Administration

Rhonda Rhodes, *Director, Graduate Programs*

Graduate Programs Committee

Rhonda Rhodes, *Chair*
Operations Management

Anwar J. Salimi
Accounting

Robert Lawrence
Computer Information Systems

Hyung Jin
Finance, Real Estate and Law

Reed M. Powell
Management and Human Resources

James E. Swartz
Marketing Management

Robert R. Westerman
Operations Management

Master of Business Administration

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.

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 College of Business Administration Graduate Programs Committee to the college 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 580 or better is required for admission of foreign students to the program.
3. The Graduate Director of the College of Business Administration will notify applicants of their admission or denial.
4. The Graduate 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. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.
   A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.
7. An advisory program study worksheet for the guidance of the student will be prepared by the Graduate 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 Director and verified by the Graduate Studies Analyst.
8. A grade-point average of 3.0 (B) 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.
10. In order to advance to candidacy for the MBA or MSBA degree, a student must: a.) achieve unconditional standing; b.) complete at least 12 units of graduate coursework at Cal Poly with a GPA of 3.0 or better; c.) pass the Graduation Writing Test; and, d.) have an approved program of study on file.
11. The candidate must be enrolled in the university during the quarter of graduation.

MBA Program

CURRICULUM

First Year

		Units
GBA 509	Managerial Computing	4
GBA 510	Financial Accounting	4
GBA 511	Financial/Managerial Accounting	4
GBA 514	Managerial Statistics	4
GBA 517	Essentials of Marketing Management	4
GBA 530	Legal Environment of Business	4
GBA 531	Production and Operations Management	4
GBA 535	Organizational Management, Principles and Behavior	4
GBA 546	Fundamentals of FinancialManagement	4
STA 120	Elementary Statistics with Applications	0
	Total, First Year	36

Second Year

REQUIRED COURSES

EC 521	Business Economics	4
GBA 551	Cost Determination and Analysis	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

* Students *must* check with Graduate Director before enrolling in these classes.

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 525	Advanced Office Systems	4
GBA 527	Organizational Communications	4
GBA 552	Analysis of Key Federal Contract Elements; Price and Cost	4
GBA 554	Database Design and Processing	4
GBA 557	Computer-Based Data Communications	4
GBA 560	Legal Environment of Information Systems	4
GBA 562	Personnel Management	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
GBA 580	Theory of Real Estate Principles and Appraisal	4
GBA 583	Practices and Application of Real Estate Law	4
GBA 599	Special Topics	4
GBA 617	Management-Union Relations	4
GBA 618	International Industrial Relations	4
GBA 620	International Business	4
GBA 622	Business Information Systems	4
GBA 630	Federal Government Contract Cases, Appeals and Jurisdiction	4
GBA 632	Production and Inventory Management	4
GBA 633	Promotion 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	Accounting for Decisions and Control	4
GBA 680	Real Estate Finance and Investment	4
GBA 681	International Real Estate and Real Estate Research	4
GBA 682	Real Estate Acquisition and Development	4
GBA 689	Financial Reporting and Communication	4
GBA 692	Independent Study	1-4
	Sub-total	8

With consent of the Graduate Director up to 8 units of approved 400-level courses in business or economics may be selected as electives.

DIRECTED ELECTIVES

Eight elective units will be chosen from the following options:

	Option I	
GBA 610	Management Policies and Strategies Practicum, AND	4
GBA 694	Business Project	4
	Option II	
GBA 691	Directed Study in Business, AND	4
GBA 695	Business Research Project	4
	Option III	
GBA 691	Directed Study in Business, AND	4
GBA 696	Master's Degree Thesis	4
	Sub-total	8
	TOTAL UNITS, Second Year	48

The Career MBA Program

The Career MBA Program is designed for those students who wish to emphasize a particular area of the curriculum. A set of courses appropiate to the career goal is selected by the student and the appropriate Graduate Faculty Advisor with the approval of the Graduate Director.

Admission to the program and other requirements are identical to those of the regular MBA. Students may change to the Career MBA or MBA at any time, but are encouraged to decide early in order to avoid taking courses for which credit cannot be given. Students with an undergraduate business major are, generally, advised not to emphasize the same area in the MBA.

The program consists of 48 units of coursework designed to insure broad competence in management, in technical skills, and in human relations as well as in the area of specialization. The curriculum for all emphases consists of a common core of 20 units, 20 elective units in the area of emphases: and, a terminal option of 8 units. Current curriculum sheets for each emphasis as well as names of the Graduate Faculty Advisors are available in the Graduate Business Administration Office.

EMPHASES

Accounting

Provides emphasis on public accounting, management accounting, or internal auditing (with the possibility of preparing for certification); or, in the areas of government and not-for-profit accounting or taxation. Intermediate accounting courses may be required for no graduate credit for some of these tracks, and are recommended for all.

Agribusiness

Designed jointly by the Colleges of Agriculture and Business Administration to offer an emphasis which is designed to prepare students for careers in agribusiness and to learn the essentials of such areas as agribusiness marketing, commodities and risk management, international agribusiness marketing and development, and the environment of the agribusiness firm, while mastering broad business skills. For ABM course descriptions, see the Agricultural Business Management graduate course section.

Business Education

For those interested in teaching business subjects at the high school, for those qualifying for community college employment, or for those who are pursuing the California State Supervision and Coordination Credential.

Entrepreneurship

For those interested in founding their own business or working effectively in the fast-changing world of growing companies. In addition to the emphasis on start-up companies and small business management, this concentration examines the strategies used in larger corporations to tap the entrepreneurial spirit.

Finance

Provides specialization in the areas of financial analysis, the management of financial institutions, security analysis, and multinational finance.

Human Resources Management (Personnel)

Covers such areas as employee selection, training and development, benefits programs, compensation, legal requirements, and personnel problems in diverse organizations. Prepares individuals for a variety of careers in the human resources field.

Information Management

For the individual who has earned an undergraduate degree in a non-computer field. Provides an understanding of computer systems as well as the systems development process via the tools and skills necessary to be an intelligent user of computer resources and/or to manage a satellite computer installation within a user department. Not designed for individuals who wish to be programmer/analysts, project leaders, or managers of information systems at the corporate level.

International Business

Provides knowledge and expertise in international business needed to allow students to work for and/or with multinational firms. Students will be introduced to the global economic environment and the complexities of multinational sources of supply, markets, and funding. Many graduates will apply their business skills to careers in international trade.

Marketing

Provides for specialization in marketing, the business function that identifies unfulfilled needs and wants, defines and measures their magnitude, determines which target markets the organization can best serve, decides on appropriate products, services, and programs to serve these markets, and calls upon everyone in the organization to "think and serve the customer." Students who complete this emphasis will develop the skills and knowledge needed to become marketing managers and aid their organizations in achieving marketing objectives.

Operations Management

Provides basic knowledge for students with career interests in the management of manufacturing and service operations. A broad selection of course offerings permits students to tailor their program in one or more of the following areas: manufacturing (JIT/Kanban, FMS, CIM), project management (PERT/CPM), inventory/materials management (MRP I, MRP II), service operations, quality assurance, purchasing, quantitative methods (simulation modeling, managerial statistics), forecasting, and facilities management.

Real Estate

Analyzes the various economic, legal, institutional and financial factors affecting the ownership of real estate, practices of real estate law, and related areas. Course offerings aid in preparing students to sit for the California Real Estate Brokers license.

Other Emphases

Students with interests other than the listed Career MBA emphases may work with the Graduate Faculty Advisor and the Graduate Director to develop an emphasis specifically designed to meet individual needs.

CURRICULUM

First Year

		Units
GBA 509	Managerial Computing	4
GBA 510	Financial Accounting	4
GBA 511	Financial/Managerial Accounting	4
GBA 514	Managerial Statistics	4
GBA 517	Essentials of Marketing Management	4
GBA 530	Legal Environment of Business	4
GBA 531	Production and Operations Management	4
GBA 535	Organizational Management, Principles and Behavior	4
GBA 546	Fundamentals of Financial Management	4
STA 120	Elementary Statistics with Applications	0
	Total, First Year	36

Second Year—Career MBA Program

Required Common Core

EC 521	Business Economics	4
GBA 551	Cost Determination and Analysis	4
GBA 561	Seminar in Organizational Behavior	4
GBA 564	Management Science	4
GBA 646	Advanced Financial Management	4
	Subtotal	20

Elective Courses

Twenty units may be selected from:

ABM 501	Environment of the Agribusiness Firm	4
ABM 504	Agribusiness Marketing	4
ABM 505	Commodities and Risk Management	4
ABM 530	International Agribusiness Marketing and Development	4
GBA 522	Information Systems Analysis and Design	4
GBA 524	Information Systems Implementation and Programming	4
GBA 525	Advanced Office Systems	4
GBA 527	Organizational Communications	4
GBA 552	Analysis of Key Federal Contract Elements; Price and Cost	4
GBA 554	Database: Design and Processing	4
GBA 557	Computer-Based Data Communications	4
GBA 560	Legal Environment of Information Systems	4
GBA 562	Personnel Management	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 580	Theory of Real Estate Principals and Appraisal	4
GBA 583	Practices and Application of Real Estate Law	4
GBA 599	Special Topics	4
GBA 617	Management-Union Relations	4
GBA 618	International Industrial Relations	4
GBA 620	International Business	4
GBA 622	Business Information Systems	4
GBA 630	Federal Government Contract Cases, Appeals and Jurisdiction	4
GBA 632	Production and Inventory Management	4
GBA 633	Promotion Management	4
GBA 635	Motivation and Marketing Behavior	4
GBA 643	Management Information Systems	4
GBA 647	Security Analysis and Portfolio Management	4
GBA 649	Working Capital Management	4
GBA 652	Marketing Seminar	4
GBA 659	Accounting for Decisions and Control	4
GBA 671	Management Seminar	4
GBA 680	Real Estate Finance and Investment	4
GBA 681	International Real Estate and Real Estate Research	4
GBA 682	Real Estate Acquisition and Development	4
GBA 689	Financial Reporting and Communication	4
GBA 692	Independent Study	1–4

With the approval of the Graduate Director, up to 12 units may be selected from approved 400-, 500-, and 600-level courses such as business or economics.

DIRECTED ELECTIVES

Eight elective units will be chosen from the following options:

Option I

GBA 610	Management Policies and Strategies Practicum, AND	4
GBA 694	Business Project	4

Option II

GBA 691	Directed Study in Business, AND	4
GBA 695	Business Research Project	4

Option III

GBA 691	Directed Study in Business, AND	4
GBA 696	Master's Degree Thesis	4
		8
	TOTAL UNITS, Second Year	48

Master of Science in Business Administration

In the College of Business Administration

The College 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 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 College of Business Administration Graduate Programs Committee to the college 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 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 580 or better is required for admission of foreign students to the program.
3. The Graduate Director of the College 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 Graduate Studies Analyst.

REQUIREMENTS

1. The degree program must include a minimum of 45 quarter units.
   No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.
   A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.
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. Advancement to candidacy must be achieved.
4. The candidate must fulfill the terminal requirement of a comprehensive examination.
5. The candidate must be enrolled in the university during the quarter of graduation.

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. 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.

REQUIRED FOR ADMISSION TO THE PROGRAM

ACC 301	Intermediate Accounting	4
GBA 522	Information Systems Analysis and Design	4
GBA 524	Information Systems Implementation and Programming	4
	Total	12

The program of study for the MSBA in EDP Auditing will consist of 33 required units and 12 approved elective units.

REQUIRED COURSES

MSBA COMMON CORE

GBA 527	Organizational Communications	4
GBA 561	Seminar in Organizational Behavior	4
GBA 691	Directed Study	4
	Sub-total	12

REQUIRED COURSES IN THE OPTION

GBA 557	Computer-Based Data Communications	4
GBA 560	Legal Environment of Information Systems	4
GBA 577	Advanced EDP Auditing	4
GBA 578	Security and Privacy of Information Systems	4
GBA 622	Business Information Systems	4
	Sub-total	20

ELECTIVE COURSES

With the approval of the EDP advisor and Graduate Director, a minimum of 12 units is to be selected from the following list.

ACC 419	Auditing Theory	4
ACC 420	Advanced Auditing	4
ACC 424	Internal Auditing	4
ACC 426	Government and Not-for-Profit Accounting	4
CIS 415	Systems Analysis and Design Methodologies	4
CIS 423	Software Quality Assurance	4
CIS 433	EDP Auditing	4
CIS 434	Advanced Structured Programming	4
CIS 435	Systems Studies and Development Project	4
CIS 455	Structured Analysis and Design Project	4
CIS 457	Distributed Data Processing Systems	4
CIS 458	Information Resource Management	4
CIS 464	Business Software Project	4
EC 521	Business Economics	4
GBA 525	Advanced Office Systems	4
GBA 551	Cost Determination and Analysis	4
GBA 554	Database Design and Processing	4
GBA 563	Executive Development	4
GBA 564	Management Science	4
GBA 646	Advanced Financial Management	4
GBA 659	Accounting for Decisions and Control	4
GBA 692	Independent Study	1-4
	Sub-total	12

TERMINAL REQUIREMENT

GBA 697	Comprehensive Exam	1
TOTAL		45

Graduate Course Descriptions

GBA 509 Managerial Computing (4)

Introduction to personal computing for management support and decision making. Use of microcomputers and terminals for computing applications in text processing, spreadsheets, graphics, database inquiry, data analysis and modeling. 4 lecture-problem solving.

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. 4 lecture-discussions.

GBA 511 Financial/Managerial Accounting (4)

GBA 510 continuation. Accounting principles used in the collection, interpretation, and use of financial data from the standpoints of creditors, investors, and management. Study of cost concepts, production cost analysis and cost-volume-profit analysis. 4 lecture-discussions. Prerequisite: GBA 510 or equivalent.

GBA 514 Managerial Statistics (4)

Decision making using classical techniques, non-parametric 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. 4 lecture-discussions. Prerequisite STA 120, equivalent, or consent of instructor.

GBA 517 Essentials of Marketing Management (4)

Development of marketing strategy to identify and serve the needs of an organization's markets and publics. Concepts relating to the analysis, planning, implementation and control of marketing strategy involving product, promotion, pricing and distribution decisions made within an external environmental context. 4 lecture-discussions.

GBA 522 Information Systems Analysis and Design (4)

Application of structured analysis and design techniques to case studies and projects in computer information systems development. 4 lecture-problem solving. Prerequisite: GBA 509.

GBA 524 Information Systems Implementation and Programming (4)

Structured program design. Interactive program development. Use of procedural programming language to develop typical business computer applications. 4 lecture-problem solving. Prerequisite: GBA 509.

GBA 525 Advanced Office Systems (4)

Application of electronic office support systems for increased productivity of manager/professionals. Topics include office automation, information processing, copy processing/reprographics, electronic storage and records management, telecommunications, ergonomics and human factors of implementing change. 4 lecture-problem solving.

GBA 527 Organizational Communications (4)

Developing communications 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. 4 lecture-discussions.

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. 4 lecture-discussions.

GBA 531 Production and Operations Management (4)

Introduction to fundamental concepts of production and operations management. Use of quantitative methods, forecasting, resource allocation, decision theory, capacity planning, project management, inventory and quality control. 4 lecture-problem discussions. Prerequisite: GBA 514.

GBA 532 Fundamentals of Contracts and Administration (4)

A study of the procedures/applications associated with Federal Acquisition Regulations (FAR). In-depth approach at operational level. Sets pace for employment of FAR, concept formation, contract life and program's successful completion. 4 lecture-problem solving.

GBA 535 Organizational Management, Principles and Behavior (4)

Integration of management functions and behavioral processes as they relate to the operation of total enterprise. 4 lecture-discussions, case studies, experiential exercises.

GBA 540 Foundations of Business and Training Education (4)

Principles, philosophy, and history of business and training education. Principles of curriculum development and evaluation; role and scope of business and training education and relationship to total educational program. 4 lecture-discussions.

GBA 541 Review of Research in Business and Training Education (4)

Criteria for evaluation of research in business and training education. Survey of methods employed in research; review and evaluation of reported research; areas of needed research. Development of research proposal. 4 lecture-discussions. Prerequisite: GBA 540.

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. 4 seminar-discussions. 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. 4 lecture-discussions. Prerequisite: GBA 510.

GBA 550 Seminar in Business and Training Education (4)

Discussion of selected areas in business and training education. 4 seminar-discussions. Prerequisite: GBA 540 or consent of instructor.

GBA 551 Cost Determination and Analysis (4)

Accounting for costs of production and distribution. Process and job order costing; standard costs. Special attention to managerial uses of budgeting and cost data for control and decision-making purposes. Lecture-discussion, 4 hours. Prerequisite: GBA 511 or equivalent.

GBA 552 Analysis of Key Federal Contract Elements; Price and Cost (4)

A study of problems related to federal contracts' categories, either price contract or cost contract. Examines policies/procedures of Federal Acquisition Regulations (FAR) price/cost regulations. Includes DOD/DFAS (variations of FAR) applications, influence and advances price/cost policy/theory. 4 lecture-problem solving.

GBA 554 Database Design and Processing (4)

Logical relationships of data. Data structures. Database design and implementation. Database inquiry and data analysis using a nonprocedural programming language. 4 lecture-problem solving. Prerequisite: GBA 524.

GBA 557 Computer-Based Data Communications (4)

Introduction to the use of computers to support data communications. Information systems design issues related to hardware, software, media, networks and protocols. 4 lecture-problem solving. Prerequisite: GBA 522.

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 lecture-discussions. 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; 4 lecture-discussions. Prerequisite: GBA 535.

GBA 562 Personnel Management (4)

Analytical and Descriptive overview of all the main sub-fields within personnel (human resources) management. Typical personnel problems of diverse organizations and their solutions, using contemporary techniques in accordance with legal requirements. 4 lecture-problem solving. Prerequisite: GBA 535.

GBA 563 Executive Development (4)

Analysis of the factors endemic to the successful executive and how these skills and traits can be acquired. 4 seminar-discussions. 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. 4 lecture-discussions. Prerequisites: GBA 514 and 531.

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. 4 lecture-discussions.

GBA 577 Advanced EDP Auditing (4)

Hands on experience in applying EDP Auditing techniques and methods. Fundamentals of advanced concepts in EDP Auditing. 4 lecture-discussion and projects. Prerequisites: CIS 433, GBA 522 and GBA 524 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 lecture- discussions. Prerequisites: CIS 433 and GBA 557, or equivalent experience.

GBA 580 Theory of Real Estate Principles and Appraisal (4)

Analysis of the economic, legal, institutional, and financial factors affecting the ownership of real estate and its valuation. Qualifies students for the California Real Estate Brokers License Examination. Not available for credit to students with both Real Estate Principles and Real Estate Appraisal courses in their undergraduate studies. 4 lecture problem solving.

GBA 583 Practices and Application of Real Estate Law (4)

Critical analysis of common and statuatory law related to California Real Estate Transactions. Guest lectures by practitioners on responsibilities and liabilities of real estate operations. Qualifies students for Real Estate Brokers License Examination. Not available for credit for students with courses in Real Estate Law and Practices. 4 lecture-problem solving. Prerequisites: GBA 530 and GBA 680 or equivalents.

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. No limitation on repeats. 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. This course, when combined with GBA 694 Business Project, will meet the terminal requirement for the MBA program. Computer-based simulation, 4 lecture-problem solving. Unconditional standing requirement.

GBA 617 Management-Union Relations (4)

The evolving interaction of unions and management within organizations. In-depth look at productivity, quality of working life, and components of our rapidly changing work culture. The future of participative management, legislation, collective bargaining, and arbitration. 4 lecture-discussions. Unconditional standing requirement.

GBA 618 International Industrial Relations (4)

Survey of structures of international labor-management relations in various economic systems. Discussion of varying rules of government and results of interaction of unions, management, government, and rapidly changing values. 4 lecture-discussions. Unconditional standing requirement.

GBA 620 International Business (4)

Survey of social, economic, and political factors governing conduct of business abroad. Analysis of successful and unsuccessful methods of international managers and their staffs. 4 lecture-discussions. Unconditional standing requirement.

GBA 622 Business Information Systems (4)

Conceptual foundations of information systems and their use in organizations. Study of data/information flow between functional subsystems and the interdependencies involved in an integrated system. Information planning and system development strategies. System security and controls. 4 lecture-problem solving. Prerequisites: GBA 554 and GBA 557. Unconditional standing requirement.

GBA 630 Federal Government Contract Cases, Appeals and Jurisdiction (4)

Study and criticism of federal contracts. Study of important statutes which are framed and directed only at government contracts. 4 lecture-problem solving. Unconditional standing requirement.

GBA 632 Production and Inventory Management (4)

Management of production systems. Techniques of master production scheduling, short- and medium-range planning, aggregate inventory management, distribution requirements planning, production activity control, scheduling and sequencing, shop floor control. Priority and input-output control. 4 lecture-problem solving. Prerequisites: GBA 531 and 564. Unconditional standing requirement.

GBA 633 Promotion Management (4)

Advertising management as related to entire communication effort of the organization. Emphasis on communication theory, advertising, customer analysis, communicative goals, positioning, personal selling, sales promotion, public relations, publicity, media planning, and budgeting. Cases. Design of promotion plan. 4 lecture-problem solving. Unconditional standing requirement.

GBA 635 Motivation and Market Behavior (4)

Theory and application of the fundamentals of human behavior that affect buying decisions: perception, learning, social and cultural factors. Models of consumer behavior. Selected applications including diffusion of innovation, opinion leadership, marketing communications. Applications to industrial markets and institutional markets. 4 lecture-problem solving. Prerequisite: GBA 517. Unconditional standing requirement.

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. 4 lecture-problem solving. Prerequisites: GBA 509 and all required 500-level courses. Unconditional standing requirement.

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. 4 lecture-discussions. Prerequisites: GBA 564, EC 521 and all required 500-level courses. Unconditional standing requirement.

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. 4 seminar-discussions. Prerequisite: GBA 546. Unconditional standing requirement.

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. 4 lecture-problem solving. Prerequisites: GBA 546 and 564. Unconditional standing requirement.

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. 4 lecture-discussions. Prerequisites: GBA 517 and all required 500-level courses. Unconditional standing requirement.

GBA 659 Accounting for Decisions and Control (4)

Accounting information systems for management control in business and not-for-profit organizations. In-depth analysis of case problems covering the development and use of costing data and issues of budgeting, performance evaluation and control. 4 lecture-discussions. Prerequisite: GBA 551 or equivalent. Unconditional standing requirement.

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. 4 seminar-discussions. Prerequisites: GBA 561 and all required 500-level courses. Unconditional standing requirement.

GBA 680 Real Estate Finance and Investment (4)

Trends in real estate investment opportunities. Current theories and techniques applied to real estate financing, acquisition, real estate mortgage markets, mortgage banking, and brokerage/investment strategies. Partial qualification for the California Real Estate Brokers License Examination. Available for credit for students with FRL 486 only by petition. 4 lecture-problem solving. Prerequisites: GBA 580 and GBA 546 or equivalents. Unconditional standing requirement.

GBA 681 International Real Estate and Real Estate Research (4)

Problems and methods of acquiring, financing, transferring, and managing real estate in foreign countries, and with foreign owned and operated real estate entities in the United States. Market analysis techniques for foreign and domestic investment properties. 4 lecture-problem solving. Prerequisites: GBA 580, GBA 583, and GBA 546 or equivalents. Unconditional standing requirement.

GBA 682 Real Estate Acquisition and Development (4)

Review and application of methods and processes for acquisition and development of investment real estate, including search, negotiation, financial analysis, market analysis, building design, construction, property management and marketing. Partial qualification for the California Real Estate Brokers License Examination. Available for credit for students with FRL 490 only by petition. 4 lecture-problem solving. Unconditional standing requirement.

GBA 689 Financial Reporting and Communication (4)

Alternative accounting principles and their effects on reported results. Analysis of information in the primary financial statements and evaluating financial position and results of operation. Evaluating the liquidity, stability, profitability and growth potential of business entities. 4 lecture-discussions. Prerequisite: GBA 551 or equivalent. Unconditional standing requirement.

GBA 691 Directed Study (1-4)

Independent, directed study of advanced topics in business. Class meetings and individual conferences with the instructor to be arranged. Total credit limited to 4 units. Precedes enrollment in GBA 695, GBA 696, or GBA 697. For MSBA in EDP Auditing candidates, GBA 577 and GBA 578 are prerequisites. Unconditional standing required.

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. Study is not to be part of final research project. Total credit limited to 4 units. Unconditional standing required.

GBA 694 Business Project (4)

A written research project concerning a significant problem in business. GBA 610 combined with GBA 694 meet the requirement for the MBA terminal option. Total credit limited to 4 units. Prerequisite: Completion of 36 units of second-year program. Advancement to Candidacy required.

GBA 695 Business Research Project (2–4)

A written research project concerning a significant problem in the field of business. Directed by a committee of graduate faculty members. Total credit limited to 4 units. Prerequisites: GBA 691 for MBA candidates and approved committee form on file in Business Graduate Office. Advancement to Candidacy required.

GBA 696 Master's Degree Thesis (2–4)

A formal thesis concerning a significant problem in the field of business. Directed by a committee of graduate faculty members. Total credit limited to 4 units. Prerequisites: GBA 691 for MBA candidates and approved committee form on file in Business Graduate Office. Advancement to Candidacy required.

GBA 697 Comprehensive Examination (1)

An examination on the subject areas of the candidate's coursework listed on the degree program. May be repeated once. Candidates must register through the MSBA in EDP Auditing advisor. Advancement to Candidacy required.

GBA 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis, project or comprehensive examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

CHEMISTRY

Master of Science in Chemistry

In the Department of Chemistry, College of Science

Patrick Wm. Mobley, *Chair*

Graduate Program Committee

Yu-Ping Hsia, *Chair*
Fredrick Bet-Pera
George Gutnikov
Keith Howard

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 student'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. At least 24 units must be taken in 500–600 level courses.
2. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.
   A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.
3. The student must complete his program based upon the curriculum outlined below.
4. The student must demonstrate a reading knowledge of a modern foreign language or proficiency in a computer programming language acceptable to the chemistry department.
5. A grade point average of 3.0 (B) or better must be maintained in all upper division undergraduate and all graduate courses.
6. Advancement to Candidacy must be achieved. Satisfaction of the Graduation Writing Test (GWT) requirement is necessary before advancement.
7. An acceptable thesis must be completed and the necessary copies submitted in accordance with university regulations.
8. An examination in defense of the thesis must be successfully completed.
9. The candidate must be enrolled in the university during the quarter of graduation.

Curriculum

Required Courses

		Units
CHM 550	Seminar in Chemistry (Student must enroll for 1 unit of seminar during 3 separate quarters)	3
CHM 696	Master's Degree Thesis	9
Courses in an area of Specialization		8

Select 6 units in an area of specialization, to be selected from CHM 522, 523 (theoretical); CHM 541, 542, 543 (organic); CHM 553, 554 (physical); CHM 561, 562 (biochemistry); CHM 571, 572 (inorganic); or CHM 581, 582, 583 (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, 543, 553, 554, 561, 562, 571, 572, 581, 582, 583. May be repeated for a maximum of 7 units.

CHM 522, 523 Advances in Chemical Physics (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, Applications of reaction dynamics. 3 lecture-discussions. Prerequisite: CHM 419 or consent of instructor. Concurrent: CHM 513.

CHM 531 Solution and Relaxation Kinetics (3) Sp, even years

The main focus will be on the application of relaxation kinetics to the study and analysis of relatively complex multi-step reactions in solution. Treatment will unify practical and theoretical considerations with respect to experimental design, instrumentation, limitations and relationship to conventional kinetic methods. Specific topics will include: spectrophotometric detection of intermediate, reversible and non-reversible systems, introduction to normal mode analysis, amplitude effects and detailed analysis of representative examples from the recent literature and research in progress. 3 lecture-problems. Prerequisite: CHM 305 or 313 or consent of instructor.

CHM 541, 542, 543. Selected Topics in Organic Chemistry (3) (3) (3) F, W, Sp

Recent advances in topics of interest in the area of organic chemistry, for example, reaction mechanism, synthesis, spectroscopy, polymers, heterocycles, natural products as well as physical organic, organometallic, bioorganic, industrial and photochemistries. Each course may be repeated once for credit. 3 lecture-discussions. Concurrent: CHM 513.

CHM 544 Special Topics in Organic Chemistry (3) Sp, even years

Selected topics in organic chemistry. Course may be repeated once for credit. 3 lecture-discussions. Concurrent: CHM 513.

CHM 550 Seminar in Chemistry (1) F, W, Sp

Special problems in selected areas of chemistry. May be repeated for a maximum of 3 units. 1 seminar-discussion.

CHM 553, 554 Advances in Physical Chemistry (3) (3) F, odd years; W, even years, respectively

Selected topics from advanced physical chemistry such as statistical mechanics, electrochemistry kinetics and solution chemistry. 3 lecture-discussions. Concurrent: CHM 513.

CHM 561, 562 Selected Topics in Biochemistry (3) (3) W, Sp respectively

Basic principles as applied to topics of biochemical interest, for example, cellular energetics and kinetics, analysis of the structure and function of proteins and other macromolecules, feedback control metabolism, trace nutrients, biochemistry of membranes, marine biochemistry, biochemical genetics, and biochemical evolution. Each course may be repeated once for credit. 3 lecture-discussions. Concurrent: CHM 513.

CHM 565 Biochemical Mechanisms (3) F, odd years

General mechanistic principles of organic and inorganic chemistry as they relate to biochemistry. 3 lecture-discussions.

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. 3 lecture-discussions.

CHM 571, 572 Advances in Inorganic Chemistry (3) (3) W, Sp, even years, respectively

Selected topics in advanced inorganic chemistry such as physical methods of inorganic chemistry, reaction mechanisms, organometallic chemistry, applications of group theory. 3 lecture-discussions. Concurrent: CHM 513.

CHM 581, 582, 583 Advances in Analytical Chemistry (3) (3) (3) F, W, Sp

Selected topics in modern analytical chemistry. Each course may be repeated once for credit. 3 lecture-discussions. 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. Total credit limited to 3 units. Unconditional standing requirement.

CHM 696 Master's Degree Thesis (1-3) F, W, Sp, Su

Compilation, evaluation, interpretation, and report of research for thesis. Completion of approved, bound thesis. Total credit limited to 9 units. Advancement to Candidacy requirement.

CHM 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy requirement.

COMPUTER SCIENCE

Master of Science in Computer Science

In the Department of Computer Science, College of Science

Bruce P. Hillam, *Chair*

Barry I. Soroka, *Coordinator, Graduate Program*

The Master of Science program in Computer Science will provide an opportunity to deepen the student's understanding of the principal hardware and software themes and develop his/her 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 judgment.

Admission to the Program

For admission as an unconditional graduate student the applicant should have completed, with a 3.0 (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	Compiler Design
e. MAT	208	Linear Algebra
f. MAT	214	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 unconditional graduate standing.

All students will be required to take the Graduate Record Exam (GRE) Subject Test in Computer Science with a minimum score of 50 percentile. In addition, foreign students are required 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 requirements to be completed for the degree.

Requirements

Students are urged to know the general scholastic requirements described in the early pages of the Graduate Studies section of the catalog.

No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract. A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate courses.

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted to an unconditional student, having passed the Graduation Writing Test (GWT), and upon the recommendation of his/her faculty advisor and implies a readiness to attempt thesis. The candidate must be enrolled during the quarter of graduation.

Curriculum

Required Courses

		Units
CS 525	Advanced Computer Organization	4
CS 530	Advanced Algorithm Design and Analysis	4
CS 540	Software Systems	4
CS 664	Graduate Seminar	2
CS 691	Directed Study	3
CS 696	Master's Degree Thesis	4

One of the following courses:

CS 515	Automated Reasoning	4
CS 517	Natural Language Processing	4
CS 519	Computer Vision	4
CS 521	Robotics	4
CS 523	Expert Systems	4

Electives

Two of the following courses		8
CS 510	Computer Assisted Instruction	4
CS 515	Automated Reasoning	4
CS 517	Natural Language Processing	4
CS 519	Computer Vision	4
CS 521	Robotics	4
CS 523	Expert Systems	4
CS 531	Computability and Complexity Theory	4
CS 541	Programming Language Semantics	4
CS 555	Computer Image Processing	4
CS 565	Computer Networking and Distributed Computing	4
CS 580	Software Engineering Metrics and Models	4
Approved upper division or graduate level offerings		12
Total		45

Graduate Course Descriptions

CS 510 Computer Assisted Instruction (4)

General techniques for designing computer systems to provide individualized instruction. Program structure, instruction layout, scoring systems and data organization methods. Existing CAI packages and development of new packages. Hardware requirements for audio-visual effects. 4 lecture-problems. Prerequisite: CS 230.

CS 515 Automated Reasoning (4)

Logical foundations, logical representation of knowledge, unification, theorem proving, deductive databases, logic programming, program verification and synthesis, nonstandard logics, epistemic logic, temporal logic. 4 lecture-problems. Prerequisites: CS 352, CS 420 and PHL 202 or consent of instructor.

CS 517 Natural Language Processing (4)

Grammatical structure and parsing of natural language, representations of meanings (semantics), story understanding and generation, applications. 4 lecture-problems. Prerequisites: CS 352, CS 420 and PHL 202 or consent of instructor.

CS 519 Computer Vision (4)

Representation of images, image data acquisition, methods of object recognition, representation of visual knowledge, boundary detection, texture, motion, the problem of occlusion, applications. 4 lecture-problems. Prerequisites: CS 352 and CS 420.

CS 521 Robotics (4)

Robot programming, languages, and simulation. Origins and taxonomy of robots. Case study in robot architecture, hardware and software. Homogeneous transformations. Kinematic equations and their solution. Elementary digital control. Prerequisites: MAT 214 and CS 231.

CS 523 Expert Systems (4)

Expert systems construction. Knowledge representation, utilization and acquisition. Rule based systems, fuzzy logic, knowledge engineering. 4 lecture-problems. Prerequisite: CS 420.

CS 525 Advanced Computer Organization (4)

Principles and concepts of computer architecture and organization. Pipelining and parallelism, multi-processor and distributed processing systems. Historical developments, architectural tradeoffs and innovations. Case studies. 4 lecture-problems. Prerequisites: CS 365 or consent of instructor.

CS 530 Advanced Algorithm Design and Analysis (4)

Classic designs: greedy; divide-and-conquer; dynamic programming; branch-and-bound. Complexity analysis: asymptotic notation; average, worst-case and amortized analyses; lower bounds. Classic problems and algorithms. 4 lecture-problems.

CS 531 Computability and Complexity Theory (4)

Formalizing problems and algorithms. Characterizations and properties of computability classes, undecidability. Complexity classes. NP-complete problems, proof of NP-completeness. 4 lecture-problems.

CS 540 Software Systems (4)

Syntax directed translation. Code and loop optimization. Data flow analysis. 4 lecture-problems. Prerequisites: CS 408 and 441.

CS 541 Programming Language Semantics (4)

Operational, denotational, and axiomatic semantics of programming languages. Vienna definition language, w-grammars, LISP definition. 4 lecture-problems. Prerequisites: CS 408 and 441.

CS 555 Computer Image Processing (4)

Digital picture processing. Mathematical preliminaries for image processing. Visual perception. Digitization and compression. Image enhancement, restoration, and reconstruction. 4 lecture-problems. Prerequisites: MAT 214 and CS 445.

CS 565 Computer Networking and Distributed Computing (4)

Modeling and quantitative approaches to computer networks, teleprocessing, and distributed computing. Statistical multiplexing and packet switching, buffering, front-end processing, network structures, and distribution of control hardware, data, and software. 4 lecture-problems. Prerequisite: CS 405.

CS 580 Software Engineering Metrics and Models (4)

The role of metrics and models in software development. Product metrics, process metrics, models, and empirical validation. Measurement and analysis, implementation of a metrics program. 4 lecture-problems. Prerequisites: STA 330 and CS 480.

CS 599 Special Topics for Graduate Students (1–4)

Group study of a selected topic, the title to be specified in advance. Prerequisite: Consent of instructor.

CS 664 Graduate Seminar (2)

Topics chosen according to the interests and needs of the students. May be repeated for a maximum of 4 units. Unconditional standing requirement.

CS 691 Directed Study (1–3)

Individual study program in a computer science area chosen by the student under the direction of a graduate faculty member. Open only to unconditional students with approval of the advisor. Maximum credit, 3 units. Unconditional standing requirement.

CS 696 Master's Degree Thesis (1–4)

Independent research under supervision of a committee of graduate faculty members, Reporting of research results in an oral presentation and an acceptable written form. Open only to candidates with approval of the advisor. May be repeated for a maximum of 4 units credit. Advancement to Candidacy requirement.

CS 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis. The candidate must be enrolled in the university during the quarter in which he/she graduates. Open only to candidates with approval of the advisor. Advancement to Candidacy requirement.

ECONOMICS

Master of Science in Economics

In the Department of Economics, College of Arts

Sidney M. Blumner, *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 (B) or better in economics courses and a grade point average of 2.7 overall. 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. 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 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.

A maximum of 16 units may be taken in approved upper-division (300- or 400-level) courses. A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate work.

The Graduation Writing Test (GWT) must have been passed prior to Advancement to Candidacy.

To attain Advancement to Candidacy for the degree, each student shall indicate in writing the decision as to the manner of fulfilling the terminal requirement. The candidate will satisfy the culminating experience with either a thesis or a comprehensive examination.

The candidate must be enrolled in the university during the quarter of graduation.

Curriculum

Required Courses	16 *Units*
EC 550 Microeconomic Analysis	4
EC 551 Macroeconomic Analysis	4
EC 552, 553 Econometrics	4,4
Field of Specialization	8
Electives	16-21
Terminal Requirement	0-5
Master's Degree Thesis	1-5
*Comprehensive examination	0
Total	45

* Students electing this option will include 5 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. 4 seminar-discussions. Prerequisites: Graduate standing and an elementary knowledge of economics. For non-economics students only.

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. 1-3 hours seminar-discussion.

EC 550 Microeconomic Analysis (4)

Analysis of the resources allocation systems and behavior of producing and consuming units. 4 lecture-discussions. Prerequisites: Some knowledge of elementary calculus and linear algebra; and, intermediate price theory (equivalent to EC 311, EC 312, and EC 406); or consent of instructor.

EC 551 Macroeconomic Analysis (4)

Analysis of aggregate national economic activities. 4 lecture-discussions. Prerequisites: Some knowledge of elementary calculus and linear algebra; and, 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. 4 lecture-discussions. Prerequisites: 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. 4 lecture-discussions. Prerequisites: Intermediate microeconomics, mathematical analysis (equivalent to MAT 125) 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. 4 lecture-discussions. Prerequisites: EC 311, 313, 308, and 405; or consent of instructor. Unconditional standing requirement.

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. 4 lecture-discussions. Prerequisites: EC 311, 313 and 404; or consent of instructor. Unconditional standing requirement.

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. 4 lecture-discussions. Prerequisites: EC 308, 311 and 313; or consent of instructor. Unconditional standing requirement.

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. 4 lecture-discussions. Prerequisites: EC 311 and 312; or consent of instructor. Unconditional standing requirement.

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. 4 lecture-discussions. Prerequisites: EC 311 and 312; or consent of instructor. Unconditional standing requirement.

EC 660 Public Finance (4)

Government taxation and expenditure. The fiscal decision process and fiscal choice theory. Government budgeting and cost benefit analysis. 4 lecture-discussions. Prerequisite: Consent of instructor. Unconditional standing requirement.

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. 4 lecture-discussions. Prerequisite: Undergraduate economic development or equivalent or consent of instructor. Unconditional standing requirement.

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. 4 lecture-discussions. Prerequisite: Undergraduate economic development or equivalent or consent of instructor. Unconditional standing requirement.

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. 4 lecture-discussions. Prerequisite: Undergraduate urban and regional economics or consent of instructor. Unconditional standing requirement.

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. 4 lecture-discussions. Prerequisite: Undergraduate regional economic analysis or equivalent or consent of instructor. Unconditional standing requirement.

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, 6 units. Unconditional standing required.

EC 696 Master's Degree Thesis (1–3)

Independent research and study under the supervision of the faculty. Reporting the research results in the approved form. Maximum credit, 5 units. Advancement to Candidacy required.

EC 697 Comprehensive Examination (0)

Preparation for and completion of the written comprehensive examination. Advancement to Candidacy required.

EC 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the SP grade until the completion of the thesis. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy required.

EDUCATION

Master of Arts in Education

In the School of Education

Jane S. McGraw, *Coordinator of Graduate and Professional Studies*

Education Graduate Committee

Jane S. McGraw, *Chair*

Roy A. Armstrong	Richard DeNovellis	Roslynn Seidenstein
Barbara Bromley	Constance Lim	George Shail
Ellen Curtis-Pierce	Susan Mortorff-Albert	Cecilia Cota-Robles Suarez
Carolyn H. Denham	Robert Muffoletto	

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. Postbaccalaureate 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 specialist 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 "undeclared" status with the consent of the Graduate Program Coordinator.

All applicants for admission to the program are required to take the Graduate Record Examination General Test and, optionally, the Subject Education Test. In addition, foreign students are required to take the TOEFL examination.

Applicants who do not meet the minimum grade point average of 2.75 overall grade point average in their 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 is pursuing 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 preliminary contract for a formal degree program in consultation with the Coordinator of the Graduate Program at the time of admission.

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 to 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. Thirty-two (32) units of coursework must be taken in residency.
2. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.
   A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.
3. A grade-point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and graduate courses to satisfy the requirements for the Master of Arts in Education.
4. 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. Certain exceptions can be made at the discretion of the Graduate Coordinator.
5. Advancement to Candidacy must be achieved. The Graduation Writing Test (GWT) requirement must have been satisfied beforehand.
6. A thesis or project must be satisfactorily completed as a terminal requirement.
7. The candidate must be enrolled in the university during the quarter of graduation.

CURRICULUM

The master's degree curriculum in education is a flexible one requiring a minimum of 45 units, organized as follows: 12–15 units in research and project/thesis; 18–24 units in a specific area, and; 12–18 units of electives. Credit for 13 quarter units of extension or transfer courses, or up to 18 quarter units of credit in a single specified area not offered by the School of Education, but taken at this university, may become a part of the M.A./Education contract.

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 advisor.

The curriculum consists of three elements. The first element consists of coursework from the graduate offerings in education, selected by the student and advisor 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, educational technology and media studies, minority children, philosophy, bilingual/cross-cultural education, special education and computer education. Additional areas in computer education 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. Special certificates of competence are issued in Educational Computer Technology, Educational Technology and Media Studies (see appropriate coordinator).

New programs have been developed in Curriculum and Instruction, Computer Education and Instructional Technology. The Educational Technology and Media Studies program prepares teachers for leadership in education, including classroom teaching, staff development, alternative education, and program development. This area of emphasis of the Master of Arts in Education offers a secondary strand and an elementary strand.

The Computer Education program prepares teachers for the educational application of computer technology in the K-12 curriculum. The Educational Technology and Media Studies program prepares teachers in the effective use and preparation of video tapes, films, filmstrips, audio tapes and photography for instruction in all subject areas. Specialist credentials courses in reading, bilingual/cross cultural education and special education are additional areas of emphasis of the Master of Arts in Education.

CURRICULUM AND INSTRUCTION—ELEMENTARY

The requirements for the elementary strand include the following:

		Units
EDU 451	Education of the Minority	3
EDU 456	Child and Adolescent Development	3
EDU 510	Interpersonal Relations in Teaching	3
EDU 525	Psychology of Reading	3
EDU 542	Curriculum and Instruction	3
EDU 543	Implementation of Early Childhood, Elementary and Secondary Education Programs	3–9
EDU 544	Advanced Child and Adolescent Development	3
EDU 546	School, Community and Home Relations	3
EDU 582	Developmental Disorders in Learning and Behavior	3
Electives selected with the approval of the advisor		6

CURRICULUM—SECONDARY

The requirements for the secondary strand include the following:

EDU 451	Education of the Minority	3
EDU 456	Child and Adolescent Development	3
EDU 509	Education of Contemporary Youth	3
EDU 510	Interpersonal Relations in Teaching	3
EDU 525	Psychology of Reading	3
EDU 542	Curriculum and Instruction	3
EDU 543	Implementation of Early Childhood, Elementary and Secondary Education Programs	3–9
EDU 544	Advanced Child and Adolescent Development	3
EDU 546	School, Community and Home Relations	3
EDU 582	Developmental Disorder in Learning and Behavior	3
Electives selected with the approval of the advisor		6

CURRICULUM—EDUCATIONAL COMPUTER TECHNOLOGY

The requirements for the Computer Education program include the following:

EDU 455	Educational Computer Technology Science	3
EDU 511	Educational Computer Programming	4
EDU 512	Educational Telecommunications	4
EDU 513	Educational Computer Curriculum	4
EDU 514	Educational Computer Seminar	4
EDU 515	Educational Computer Research	4
EDU 544	Advanced Child and Adolescent Development	3
EDU 570	Technology in Education	3
EDU 572	Instructional Design	4
EDU 573	Media Production	4
Electives selected with the approval of the advisor.		

CURRICULUM—EDUCATIONAL TECHNOLOGY AND MEDIA STUDIES

The requirements for the Educational Technology and Media Studies program include the following:

EDU 455	Educational Computer Technology Science	3
EDU 511	Educational Computer Programming	3
EDU 542	Curriculum and Instruction	3
EDU 570	Technology in Education	3
EDU 571	Visual Literacy	4
EDU 572	Instructional Design	4
EDU 573	Media Production	4
EDU 574	Seminar in Media Education	4
EDU 575	Video Production in Education	4
EDU 576	Television and Education	3
EDU 577	Interactive Video	4
Elective selected with the approval of the advisor		3

CURRICULUM—BILINGUAL/CROSS-CULTURAL

The requirements for the Bilingual/Cross-Cultural program include the following:

EDU 415	Reading and Language Instruction	4
EDU 451	Education of the Minority	3
EDU 452	English as a Second Language	4
EDU 546	School, Community and Home Relations	3
EDU 560	Bilingual/Cross-Cultural Methodology: Social Studies and Language Arts	3
EDU 561	Bilingual/Cross-Cultural Curriculum	3
EDU 562	Bilingual/Cross-Cultural Methodology: Mathematics and Science	3
EDU 563	Topic in Bilingual/Cross-Cultural Education	3
EDU 564	Survey of Patterns in Language for Bilingual Teaching	3
EDU 565	Advanced ESL Instruction	3

CURRICULUM—BILINGUAL/CROSS-CULTURAL EDUCATION

The requirements for the Bilingual/Cross-Cultural Education and the Educational Computer and Technology Science programs include the following:

EDU 415	Reading and Language Instruction	4
EDU 455	Educational Computer Technology Science	3
EDU 451	Education of the Minority	3
EDU 511	Educational Computer Programming	4
EDU 512	Educational Telecommunications	4
EDU 513	Educational Computers and Curriculum Design	4
EDU 514	Educational Computer Seminar	4
EDU 515	Educational Computer Research	4
EDU 546	School, Community and Home Relations	3
EDU 564	Survey of Patterns in Language	3
EDU 560	Bilingual/Cross-Cultural Methodology: Social Studies and Language Arts	3
EDU 561	Bilingual/Cross-Cultural Curriculum	3
EDU 562	Bilingual/Cross-Cultural Methodology: Mathematics and Science	3
EDU 563	Topic in Bilingual/Cross-Cultural Education	3
EDU 565	Advanced ESL Instruction	3

CURRICULUM—BILINGUAL/CROSS-CULTURAL EDUCATION-INSTRUCTIONAL TECHNOLOGY AND MEDIA EDUCATION

The requirements for the Bilingual/Cross-Cultural Education and the Instructional Technology and Media Education programs include the following:

EDU 415	Reading and Language Instruction	4
EDU 451	Education of Minority	3
EDU 458	Media Arts in Education	4
EDU 546	School, Community and Home Relations	3
EDU 560	Bilingual/Cross-Cultural Methodology: Social Studies and Language Arts	3
EDU 561	Bilingual/Cross-Cultural Curriculum	3
EDU 561	Bilingual/Cross-Cultural Methodology: Mathematics and Science	3
EDU 563	Topic in Bilingual/Cross-Cultural Education	3
EDU 564	Survey of Patterns of Language	3
EDU 565	Advanced ELS Instruction	3
EDU 570	Technology in Education Seminar	3
EDU 571	Visual Literacy	4
EDU 573	Media Production	4
EDU 574	Seminar in Media Education	4
EDU 575	Video Production in Education	4

CURRICULUM—READING

The requirements for the reading program include the following:

EDU 520	Diagnosis of Reading Difficulties	3
EDU 521	Analysis of Corrective Reading Practices and Techniques	3
EDU 522	Laboratory of Clinical Practice: Treatment of Reading Disorders	3
EDU 523	Development of Pre-Reading Skills	3
EDU 524	Advanced Study of Reading Disability	3
EDU 525	Psychology of Reading	3
EDU 526	Strategies for Competency in Teaching Reading	3
EDU 527	Technology in Reading Instruction	3
EDU 528	Linguistics, Phonics and the Teaching of Reading	3
EDU 529	Field Experiences for Specialist Credentials	3
EDU 532	Tests, Measurements and Evaluation	4
EDU 533	Advanced Study in Learning Disabilities-Prescription	3
EDU 534	Linguistics and Reading-Methodology	3
EDU 550	Seminar in Educational Issues	3
EDU 580	Language and Cognition	3
EDU 650	Current Problems and Strategies in Education	3

CURRICULUM—SPECIAL EDUCATION

The requirements for the Special Education program include the following:

Basic Generic Program (LH & SH) 15 Quarter Units

EDU 454	Exceptional Children and Youth	3
EDU 510	Interpersonal Relations in Teaching	3
EDU 520	Diagnosis of Reading Difficulties	
or EDU 523	Development of Reading Skills	3
EDU 530	Education of the Slow Learner and Retarded Child	3
EDU 582	Developmental Disorder in Learning and Behavior	3

Advanced Specialization Program (LH & SH) 12 Quarter Units

EDU 551	Mainstreaming Handicapped Learners	3
EDU 552	Career Education and Counseling for the Handicapped	3
EDU 581	Teacher Instructional Behavior for the Handicapped	3
EDU 587	Specialist Credential Research Seminar	3

Advanced Specialization Areas: Learning Handicapped 18 Quarter Units

EDU 553	Assessment and Prescription for the Learning Handcapped	3
EDU 554	Curriculum Strategies for the Learning Handicapped	3
EDU 557	Field Teaching Experiences for Special Education Credential Candidates (LH & SH)	12

Advanced Specialization Areas: Severely Handicapped 18 Quarter Units

EDU 555	Assessment and Prescription for the Severely Handcapped	3
EDU 556	Curriculum Strategies for the Severely Handicapped	3
EDU 557	Directed Teaching with the Severely Handicapped	12

Resource Specialist Certificate of Competency 12 Quarter Units

EDU 583	Special Education Resource Specialist	3
EDU 584	Organization and Management of Special Education Program	3
EDU 585	Seminar in Education Handicaps	3
EDU 586	Counseling Parents of Handicapped Individuals	3

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 School of Education. These are described in other sections of this catalog.

The following graduate courses are not applicable for the Master of Arts Degree in Education: EDU 422, 423, 424, 425, 426, 427, 428, 429, 430, 432, 433, 434, 435, 436, 437, 438, 460.

GRADUATE CERTIFICATE PROGRAMS IN EDUCATIONAL TECHNOLOGY

Admission requirements for the special certificates of competencies for the Educational Computer Technology and the Educational Technology and Media Studies programs are the same as the requirements for admission to the Master of Arts in Education degree program.

The following courses (18 quarter units) are required to complete these certificate programs, respectively:

Educational Computer Technology Program

		Units
EDU 455	Educational Computer Technology Science	3
EDU 511	Educational Computer Programming	4
EDU 512	Educational Telecommunications	4
EDU 513	Educational Technology Curriculum Design	4
EDU 514	Seminar in Educational Technology Science	4
EDU 515	Research in Educational Technology Science	4

Educational Technology and Media Studies

EDU 570	Technology in Education	3
EDU 571	Visual Literacy	4

Select any four out of the following six courses listed below:

EDU 572	Instructional Design	4
EDU 573	Media Production	4
EDU 574	Seminar in Media Education	4
EDU 575	Video Production in Education	4
EDU 576	Television and Education	3
EDU 577	Interactive Video	4

Graduate Course Descriptions

EDU 508 Philosophy of 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 lecture-discussions.

EDU 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. 3 lecture-discussions. Prerequisite: EDU 421 or consent of instructor.

EDU 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. 3 lecture-discussions. Prerequisite: EDU 421 or consent of instructor.

EDU 511 Educational Computer Programming (4)

Introduction to Basic language computer programming for educators. System commands, theory, and principles of programming. 3 lecture-discussions; 1 three-hour activity. Prerequisite: EDU 455.

EDU 512 Educational Telecommunications (4)

Editing, graphics, program modification, telecommunications, text processing and diverse programming languages. 3 lecture-discussions; 1 three-hour activity.

EDU 513 Educational Computer Curriculum (4)

Principles, organization and management of computer and technology curriculum for elementary and secondary programs. 3 lecture-discussions; 1 three-hour activity.

EDU 514 Educational Computer Seminar (4)

Study of knowledge and skills, resource and management techniques and experiences necessary to assume leadership roles in microcomputer and technology positions. 3 seminar-discussions; 1 three-hour activity.

EDU 515 Educational Computer Research (4)

Intensive research and study of selected computer, microcomputer and related technology science interests of the students enrolled. Approved topics for each student. 3 seminar-discussions; 1 three-hour activity. Prerequisite: EDU 511.

EDU 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. 3 lecture-discussions. Prerequisites: EDU 421 and 422 or 432.

EDU 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: EDU 520.

EDU 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. 2 lecture-discussions; 1 two-hour activity. May be repeated. Maximum credit: 6 units. Prerequisites: EDU 520 and 521.

EDU 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. 3 lecture-discussions. Prerequisites: EDU 421 and 422 or 432, or consent of instructor.

EDU 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. 3 lecture-discussions. Prerequisite: EDU 522.

EDU 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. 3 lecture-discussions. Prerequisites: EDU 421 and 422 or 432, or consent of instructor.

EDU 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. 3 lecture-discussions. Prerequisite: EDU 422 or 432.

EDU 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. 2 lecture-discussions; 1 two-hour activity.

EDU 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. 3 lecture-discussions. Prerequisite: EDU 422 or 432.

EDU 529 Field Experiences for Specialist Credentials (3)

Field experience for Specialist Credential candidates to fulfill a competency criterion. May be repeated for credit. Maximum credit 12 units. Only 3 units may be credited for the master's degree. Prerequisites: Admission to Specialist Credential program and consent of advisor.

EDU 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. 3 lecture-discussions. Prerequisites: EDU 421 and consent of instructor.

EDU 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. 3 lecture-discussions. Prerequisite: EDU 421.

EDU 532 Tests, Measurements and Evaluations (4)

Basic principles of educational measurement and evaluation; teacher constructed instruments and techniques; selection and interpretation of standardized and criterion referenced measurements. 4 lecture-discussions. Prerequisite; EDU 421.

EDU 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 lecture-discussions. Prerequisite: EDU 524.

EDU 534 Linguistics and Reading—Methodology (3)

Methodology and prescription of multidisciplinary reading materials based on linguistic theory. 3 lecture-discussions. Prerequisite: EDU 528.

EDU 535 The Gifted Individual: Curriculum and Instruction (3)

Current practice, research, issues and trends of teaching models and curriculum development for the gifted and talented. 3 seminar-discussions. Prerequisite: EDU 531 or consent of instructor.

EDU 536 Seminar in Giftedness and Creativity (3)

Problems of affective, cognitive, and social development of gifted and talented individuals. Examination of higher cognitive functioning and characteristics of performance of creativity. 3 seminar-discussions. Prerequisite: EDU 531 or consent of instructor.

EDU 537 Curriculum Evaluation (3)

Theory and practice of instructional program evaluation. Educational evaluation models, alternatives, and guidelines for curriculum evaluation. 3 seminar-discussions. Prerequisites: EDU 532, 535, or 542 or consent of instructor.

EDU 542 Curriculum and Instruction (3)

Curriculum models used in childhood adolescent education. Examination of curriculum emphasizing the needs of the student, the environment and teacher. 3 lecture-discussions.

EDU 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 School of Education class schedule for specific group emphasis each quarter. May be repeated for a total of 9 units. 3 lecture-discussions. Prerequisite: EDU 542 or permission of instructor.

EDU 544 Advanced Child and Adolescent Development (3)

Experimental and theoretical literature relating to the development of child and adolescent; implications for the student's continuing educational experiences. 3 lecture-discussions. Prerequisite: EDU 456 or consent of instructor.

EDU 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. 3 lecture-discussions.

EDU 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 for school curriculum. 3 lecture-discussions. Prerequisite: Permission of the instructor.

EDU 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. May be repeated for a maximum of 9 units. 3 seminar-discussions.

EDU 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 lecture-discussions. Prerequisite: EDU 454.

EDU 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 lecture-discussions. Prerequisite: EDU 454.

EDU 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. Total credit limited to 6 units. 3 lecture-discussions. Prerequisite: EDU 454.

EDU 554 Curricula 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. Total credit limited to 6 units. 3 lecture-discussions. Prerequisite: EDU 454.

EDU 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 lecture-discussions. Prerequisite: EDU 454.

EDU 556 Curricula Strategies for the Severely 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 severely handicapped. 3 lecture-discussions. Prerequisite: EDU 454.

EDU 557 Field Teaching Experiences for Special Education Credential Candidates (LH & SH) (12–12)

Supervised experience with learning handicapped or severely handicapped in special classes, resource centers, institutional setting and regular classrooms. Integrates the competencies of the candidate for the Specialist Education Credential (LH & SH). Not applicable towards a master's degree. Prerequisites: Admission to Special Education Specialist program and consent of Special Education Coordinator.

EDU 560 Bilingual/Cross-Cultural Instruction: Social Studies and Language Arts (3)

Implementation of bilingual cross-cultural instruction in social studies and language arts. Effective instructional strategies to achieve curriculum objectives. 3 lecture-problems.

EDU 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. 3 lecture-discussions. Prerequisites: EDU 560; two years of college Spanish or equivalent; possession of a teaching credential or admission to a credential program.

EDU 562 Bilingual/Cross-Cultural Instruction: Mathematics and Science (3)

Implementation of bilingual/cross-cultural strategies in mathematics and science, classroom individualization and evaluation. 3 lecture-problems.

EDU 563 Topic in Bilingual/Cross-Cultural Education (3)

Review of critical issues and topics in bilingual/cross cultural education. Refer to School of Education class schedule for specific topic each quarter. May be repeated for a total of 9 units.

EDU 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. 3 lecture-discussions. Prerequisites: EDU 560 and two years of college Spanish or equivalent; possession of a teaching credential or admission to a credential program.

EDU 565 Advanced ESL Instruction (3)

Advanced ESL instructional strategies for the non-English speaker/student. 3 lecture-problems.

EDU 570 Technology in Education Seminar (3)

The historical and theoretical development of instructional technology and its relationship to pedagogy. 3 lecture-discussions.

EDU 571 Visual Literacy (4)

Theory and application of visual concepts to communication theory, semiotics, and its application to technology, learning and pedagogy. 3 lecture-discussions; 1 three-hour activity.

EDU 572 Instructional Design (4)

Application of current research into the development of instructional materials and programmed instruction for classroom and non-classroom settings. 3 seminar-discussions; 1 three-hour activity.

EDU 573 Media Production (4)

Role of media in learning environments. Systematic approach to instructional development. Skills in the production of instructional audio-tape and slide-tape. 3 lecture-discussions; 1 three-hour activity.

EDU 574 Seminar in Media Education (4)

An intensive study of selected issues and research in media education. An examination of the social, political and educational implications of various media forms. 3 seminar-discussions; 1 three-hour activity.

EDU 575 Video Production in Education (4)

Analysis, planning and preparation of instructional television packages for educational settings. The local production of educational video-tape for educational and instructional purposes. 3 lecture-discussions; 1 three-hour activity.

EDU 576 Television and Education (3)

Research on the utilization and effectiveness of television on educational and non-educational settings. The use of television for entertainment, education, and persuasion. Critical theory as it applies to media. 3 seminar discussions.

EDU 577 Interactive Video (4)

An introduction to interactive video technology for utilization in both educational and training environments. 3 seminar-discussions; 1 three-hour activity. Prerequisites: EDU 511, 570 and 572 or permission of instructor.

EDU 580 Language 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 lecture-discussions.

EDU 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. 3 lecture-discussions. Prerequisite: EDU 454.

EDU 582 Developmental Disorders 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 lecture-discussions. Prerequisite: EDU 454 or consent of instructor.

EDU 583 Special Education Resource Specialist (3)

Problems and issues of exceptional individuals in the regular classroom; functions of the resource specialist. 3 lecture-discussions. Prerequisite: Possession of a valid Special Education Credential.

EDU 584 Organization and Management of Special Education Programs (3)

Legal compliance requirements in planning and financing special education programs. Conceptual frameworks and research in operation of special education procedures. 3 lecture-discussions. Prerequisite: Consent of Special Education Coordinator.

EDU 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. 3 lecture-discussions. Prerequisite: Consent of Special Education Coordinator.

EDU 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. 3 lecture-discussions. Prerequisite: Consent of Special Education Coordinator.

EDU 587 Specialist Credential Research Seminar (3)

Utilization of professional literature. Library reference paper, field research, curriculum innovation projects, action research, field studies. 3 seminar-discussions. Prerequisite: Consent of Graduate Coordinator.

EDU 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. 3 seminar-discussions. May be repeated for a maximum of 9 units.-Unconditional standing requirement.

EDU 690 Seminar in Educational Research (3)

Overview of research in education; emphasis on the design and implementation of research projects and theses preparation; discussion of educational issues relevant in the development of a research project. 1 three-hour seminar-discussion. Unconditional standing requirement.

EDU 691 Directed Study (1–9)

Study, research or readings of a particular problem in education directed by a faculty advisor. May be repeated for credit up to 9 units. Consent of the Graduate Coordinator and/or faculty advisor. Unconditional standing requirement.

EDU 692 Independent Study (1–6)

Independent study, research or readings proposed by the student and conducted under the supervision of a faculty member, but not leading to a thesis/project. May be repeated for credit up to 6 units. Unconditional standing requirement.

EDU 693 Introduction to Research (3)

Planning a research study and organization of a research report. Development of a research proposal. Required of Master of Arts degree in Education students. 3 seminar-discussions. Unconditional standing requirement.

EDU 694 Thesis/Project Research (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. 3 lecture-discussions. Prerequisite: EDU 693. Unconditional standing requirement.

EDU 695 Master's Degree Project (3–6)

Independent research leading to successful completion of a project. Open to graduate candidates and with approval of Graduate Coordinator. Maximum credit, 9 units. Prerequisite or concurrent: EDU 694. Advancement to Candidacy/requirement

EDU 696 Master's Degree Thesis (3–6)

Independent research leading to successful completion of a thesis. Open to graduate candidates and with approval of Graduate Coordinator. Maximum credit, 9 units. Prerequisite or concurrent: EDU 694. Advancement to Candidacy/requirement.

EDU 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis or project. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy requirement.

EDUCATION SPECIALIST CREDENTIAL PROGRAMS

In the School of Education

Jane S. McGraw, *Coordinator of Graduate and Professional Studies*

Barbara E. Bromley, *Coordinator of Special Education, Special Credentials*

California education specialist credentials are also a part of the university's curricula. Postbaccalaureate students admitted to a program leading to university recommendation for clear teaching credentials are accorded unconditional status parallel to that of master's degree students, or may pursue the master's degree in conjunction with a specialist credential; in such case the M.A. classification will be designated.

The university is approved by the State Commission on Teacher Credentialing to recommend qualified students for the Special Education Specialist Credentials (Learning Handicapped and Severely Handicapped), the Resource Specialist Certificate of Competence in Special Education, and Adaptive Physical Education Specialist Credential. Since state credential requirements are subject to changes, students should seek current information concerning new requirements from appropriate advisors in the School of Education.

ADMISSION TO CANDIDACY

Admission to the university is not equivalent to being accepted into the School of Education. A student seeking to enter a specialist credential program should possess a valid basic teaching credential. Detailed information regarding the specific program requirements for the specialist credentials is available from the designated coordinator/advisor in the School of Education.

SPECIAL EDUCATION SPECIALIST CREDENTIALS

The Special Education curriculum is designed to give credential and master's degree students a background in the environmental, physiological and social aspects of exceptionality.

The curricula in Special Education in the areas of Learning Handicapped, Severely Handicapped and the Resource Specialist Certificate of Competency have been approved by the Commission on Teacher Credentialing.

The Special Education program at Cal Poly consists of a generic component plus specialization in the areas of Learning Handicapped and Severely Handicapped.

The program may be incorporated in a "fifth year" for a clear teaching credential or combined with a Master's Degree in Education.

Prerequisites to admission to the Special Education Credential program are: (1) basic teaching credential; (2) acceptable grade point average; (3) three letters of recommendation; and (4) completion of application.

The program designed to be a minimum of one academic year or 45 quarter units is as follows:

Basic Generic Program (LH & SH) 15 Quarter Units

		Units
EDU 454	Exceptional Children and Youth	3
EDU 510	Interpersonal Relations in Teaching	3
EDU 520	Diagnosis of Reading Difficulties	
or EDU 523	Development of Pre-Reading Skills	3
EDU 530	Education of the Slow Learner and Retarded Child	3
EDU 582	Developmental Disorder in Learning and Behavior	3

Advanced Specialization Program (LH & SH) 12 Quarter Units

EDU 551	Mainstreaming Handicapped Learners	3
EDU 552	Career Education and Counseling for the Handicapped	3
EDU 581	Teacher Instructional Behavior for the Handicapped	3
EDU 587	Specialist Credential Research Seminar	3

Advanced Specialization Areas: Learning Handicapped 18 Quarter Units

EDU 553	Assessment and Prescription for the Learning Handicapped	3
EDU 554	Curriculum Strategies for the Learning Handicapped	3
EDU 557	Field Teaching Experiences for Special Education Credential Candidates (LH & SH)	12

Advanced Specialization Areas: Severely Handicapped 18 Quarter Units

EDU 555	Assessment and Prescription for the Severely Handicapped	3
EDU 556	Curriculum Strategies for the Severely Handicapped	3
EDU 558	Directed Teaching with the Severely Handicapped	12

Resource Specialist Certificate of Competency

A Resource Specialist Certificate of Competency in Special Education was approved (August 1981) by the California Commission on Teacher Credentialing for Cal Poly. To enter the program and earn the certificate, the student must hold a basic teaching credential (MS or SS), a clear Special Education Credential and have three years

or more of a combination of regular and special education teaching experiences.

The following courses (12 quarter units) will be utilized to complete this certificate program:

		Units
EDU 583	Special Education Resource Specialist	3
EDU 584	Organization and Management of Special Education Program	3
EDU 585	Seminar in Education Handicaps	3
EDU 586	Counseling Parents of Handicapped Individuals	3

Adaptive Physical Education Specialist Credential

Priscilla Stromer, Adaptive P.E. Advisor, HPER

This credential, coupled with a single-subject K-12 Physical Education Teaching Credential, authorizes one to teach adapted physical education in California public schools. The APE Credential Program can be included in a master's program.

Prerequisites to admission to the Adaptive Physical Education Credential program are: 1) K-12 Physical Education Teaching Credential and/or Multiple Subject Credential; 2) acceptable grade point average; and, 3) completion of admission to graduate school procedures.

The following courses are required for this credential program:

		Units
PE 401	Motor Assessment for Handicapped	4
PE 404	Rhythms and Dance in Movement Education	3
PE 405	Fieldwork in Adapted Physical Education	3
PE 406	Physical Education for Orthopedically Handicappedand other Health Impaired	4
PE 410	Physical Education for Mentally Handicapped	4
EDU 581	Teacher Instructional Behavior for the Handicapped	3

ENGINEERING

Master of Engineering

In the College of Engineering

Carl E. Rathmann, Director, Division of Graduate Studies

Engineering Graduate Studies Committee

Carl E. Rathmann, *Chair*

Ali R. Ahmadi	Hany J. Farran	John D. O'Neil
Mahmoud Davarpanah	T. K. Nguyen	Michael T. Shelton

The College 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 advanced work in the engineering profession. The program is designed to accept students with diverse undergraduate engineering backgrounds. Each student in the Master of Engineering degree program has the opportunity to choose from all graduate courses offered by the College of Engineering.

The student will complete a course of study individually tailored to the student's unique talents and professional goals. The course of study will feature breadth courses supplemental to the student's undergraduate education as well as courses designed to increase 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.

Successful applicants will be admitted to the program either unconditionally or with conditions imposed on them. To receive *unconditional admission*, an applicant must satisfy these criteria:

1) The applicant must hold a baccalaureate degree in engineering from a program that has been accredited by the Accreditation Board for Engineering and Technology (ABET) and for which the accreditation was in effect at the time of award of the degree. The degree must have been granted within five years prior to the proposed beginning of the graduate program. A baccalaureate degree in engineering technology does not satisfy this criterion.
2) The applicant must have achieved a grade point average of at least 3.00 in all undergraduate upper division coursework in mathematics, science and engineering and, additionally, in all coursework attempted with graduate standing.
3) The applicant must receive a positive recommendation from the Director of Engineering Graduate Studies and approval by the Dean of the College of Engineering.

Conditional admission may be granted in cases in which the applicant's academic preparation for graduate study is such that criteria 1) and/or 2) above are not satisfied. In such cases, the applicant is required to submit a recent test score of the subject Graduate Record Examination in Engineering at the 50th percentile or higher. Criterion 3) above must be met. When an applicant is admitted conditionally, the conditions to be met and the time allowed for meeting them are stated in the letter of admission. If these conditions are not satisfied, the student may be disqualified from the program.

Program Requirements

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted a student upon the recommendation of the graduate faculty and implies a readiness to attempt the project, thesis, or comprehensive examination. Students who are not candidates are not eligible to register for EGR 695, 696, or 697.

In order to advance to candidacy for the Master of Engineering degree, the student must:

1) satisfy all admissions conditions, if any;
2) complete at least 32 units of graduate coursework with a grade point average of 3.00 or better;
3) satisfy the Graduation Writing Test; and
4) with his assigned advisor, develop and file a program of study and have it approved by the Engineering Graduate Studies Committee, by the Graduate Studies Analyst, and by the Director of Engineering Graduate Studies. The program of study must be submitted for approval before the end of the second quarter of attendance.

At the time of filing of the program of study, (before the end of the second quarter of attendance), the student must opt for accomplishing a project, publishing a thesis, or passing a comprehensive examination, as a culminating experience of his/her graduate education after completing the required coursework. The project is directed by a faculty member and seeks to accomplish a very specific task. The thesis effort is broader in scope than is a project and is intended to involve independent research by the student with the goal of advancing knowledge in a specialized area. Both the project and thesis efforts include a defense of the effort by the student before a com-

mittee of faculty members. The comprehensive examination is a test of the student's expertise in his/her areas of coursework concentration. Information regarding the project, thesis, and comprehensive examination is available at the Engineering Graduate Studies Office.

In addition, each student is responsible for satisfying all university requirements specified elsewhere in the catalog.

CURRICULAR REQUIREMENTS

General requirements for advanced degrees are found in the Graduate Scholastic Requirements section of this catalog.

The curriculum for the degree Master of Engineering requires a minimum of 45 quarter units of coursework, of which at least 24 units must be in 500- and 600-level courses.

No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.

Each program of study consists of at least 15 units of breadth courses, at least 15 units of technical specialty courses, elective courses, and either a project (4-6 units), a thesis (4-9 units), or a comprehensive examination. The breadth courses are intended to insure that the student acquires a broad basis in fundamental courses in advanced mathematics, science, and engineering, and are chosen so that they will be most beneficial to the student, complementing his/her undergraduate program. Breadth courses may include at most one course from the sequence: EGR 401, 521, 538, 539, 540, 553; the rest of the breadth courses must be chosen from the sequence EGR 509-515 and any mathematics-oriented 599.

Technical specialty courses are chosen to emphasize an area which is a logical continuation of the student's undergraduate and graduate preparation. At most, one 400-level course may be included in this category, and a maximum of 4 transfer units can be used to satisfy the 15 unit requirement.

The remainder of the courses in the student's program of study will be chosen in collaboration with his/her advisor to insure consistency with the student's undergraduate preparation and graduate goals, and in order to assure an integrated educational experience. A course in the program of study may be taken only after the student has satisfied the course prerequisites for enrolling in the course. It is the student's responsibility to satisfy all prerequisites for a course prior to enrolling in the course.

Engineering graduate students may be granted graduate credit only for courses numbered 400 and above. A grade point average of 3.0 (B) or better must be maintained in all upper-division and all graduate courses. Candidates must be enrolled in the university during the quarter of graduation.

Graduate Course Descriptions

EGR 509 Advanced Differential Equations for Engineers (4)

An advanced course in applied differential equations. Multi-disciplinary engineering models are developed and solved. Analytical and numerical techniques for solving differential systems with either a single independent variable or multiple independent variables are used. 4 lecture-problems. Prerequisite: Undergraduate course in differential equations.

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. 4 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. Prerequisite: Upper-division course in structural steel analysis.

EGR 519 Advanced Reinforced Masonry Design (4)

Applied design and analysis of one and two-story reinforced masonry buildings. Design considerations in high-rise masonry structures. Design and analysis of masonry retaining walls. 4 lecture-problems. Prerequisite: CE 442, or equivalent.

EGR 520 Elasticity (4)

Theory of stress and strain for continuous media. Stress-strain relations of elasticity. Plane stress and strain. Introduction to thermoelasticity. 4 lecture-problems. Prerequisite: Upper-division courses in structural analysis and EGR 513, or consent of the instructor.

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 structures. 4 lecture-problems. Prerequisites: Upper-division courses in structural analysis, dynamics, vibrations 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. 4 lecture-problems. 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. 4 lecture-problems. Prerequisite: Upper-division course in reinforced concrete design.

EGR 524 Advanced Aerospace Vehicle Design (2)

Preliminary design of aerospace systems. Interdisciplinary concepts in design. System analysis and integration. Design optimization. Design compromise in multidisciplined systems. Trades study evaluations. Verbal and written presentation of system design. Individual and team projects. 2 three-hour laboratories. Prerequisite: Completion of 24 units of graduate level coursework.

EGR 525 Advanced Foundation Engineering (4)

Advanced analysis and design of foundations and earth retaining structures, including both structural and geotechnical considerations. Laterally loaded piles, braced excavations, sheet piles and tieback anchors. 4 lecture-problems. Prerequisite: CE 424 or equivalent.

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. 4 lecture-problems. 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. 4 lecture-problems. Prerequisite: Upper-division course in supersonic aerodynamics.

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 equation and integration of various single and multidimensional problems. Detailed discussion of thermal conductivity. 4 lecture-problems. 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. 4 lecture-problems. 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 embrittlement. 4 lecture-problems. Prerequisite: Upper-division course in stress analysis.

EGR 535 Advanced Fluid Dynamics (4)

Governing field laws: mass, momentum, energy. Reynolds' Transport Theorem: mass, momentum, energy. Cartesian tensor notation. Rotation, stress, rate-of-strain relations. Flow kinematics. Ideal fluid flow. Conformal transformations. Viscous flows: pipe, flat plate. 4 lecture-problems. Prerequisite: Upper-division course in fluid mechanics or consent of instructor.

EGR 536 Advanced Classical 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. 4 lecture-problems. Prerequisites: EGR 515 and upper-division course in dynamics, or consent of instructor.

EGR 537 Polymer Fluid Dynamics (4)

The structure, flow phenomena, and material functions for polymeric fluids. Constitutive equations available to solve polymeric fluid dynamics problems. Applications in plastics manufacturing, performance of lubricants, processing of food-stuffs, and movement of biological fluids. 4 lecture-problems. Prerequisites: Upper-division courses in heat transfer, fluid mechanics, and EGR 513.

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. 4 lecture-problems. Prerequisite: 3 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. 4 lecture-problems. 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. 4 lecture-problems. Prerequisite: EGR 515. (Some previous exposure to Laplace Transforms is recommended.)

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. 4 lecture-problems. 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. 4 lecture-problems. Prerequisites: 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. 4 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. Prerequisites: Upper-division courses in heat transfer and fluid mechanics.

EGR 551 Digital Signal Processing (4)

Development of the modern theory of digital signal processing. 4 lecture-problems. Prerequisites: Upper-division courses in Fourier transforms and ECE 428, or equivalent.

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. 4 lecture-problems. 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. 4 lecture-problems. Prerequisite: Upper-division course in digital electronics and Fourier Transforms.

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. 4 lecture-problems. Prerequisites: 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. 4 lecture-problems. Prerequisite: Upper-division course in stress analysis.

EGR 557 Analysis of Mechanical Designs (4)

Analysis of common machine elements. Relation to design decision making. Optimization, reliability, miniaturization, and statistical strength theory. 4 lecture-problems. Prerequisite: Upper-division course in stress analysis.

EGR 558 Computer Arithmetic (4)

High speed multiplication and division algorithms. Residue, floating-point, and distributed arithmetic. Hardware structure for functional evaluations. 4 lecture-problems. Prerequisite: Undergraduate course in computer architecture.

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. 4 lecture-problems. 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. 4 lecture-problems. Prerequisite: Upper-division course in probability theory.

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. 4 lecture-problems. 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 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. 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. 3 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. Prerequisite: Upper-division course in hydrology.

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. 4 lecture-problems. 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. 4 lecture-problems. Prerequisite: Undergraduate course in engineering economy.

EGR 575 Inlet Design (4)

Subsonic, supersonic and hypersonic inlet design. Subsonic inlets: friction loss, diffusion, plenum chambers, pressure recovery. Transonic effects: pre-entry flow, separation, shock-boundary layer interaction. Supersonic compression: external, internal, boundary layer bleed. Cowl design. Additive drag. Flow distortion. Matching and control. Applications to aircraft and helicopters. 4 lecture-problems. Prerequisites: Undergraduate courses in gas dynamics and propulsion.

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. 4 lecture-problems. Prerequisites: 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. 4 lecture-problems. 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 lecture-problems. 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. 4 lecture-problems. Prerequisites: 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. 4 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. Prerequisites: Upper-division courses in hydraulics and reinforced concrete.

EGR 583 Aerodynamic Heating (4)

Fundamental equations. Laminar and turbulent boundary layer properties. Laminar and turbulent skin friction. Recovery temperature. Reference enthalpy method. Slip flow. Free molecule flow. Stagnation point heat transfer. Mass transfer cooling. Calculation of skin temperature. 4 lecture-problems. Prerequisites: Undergraduate courses in heat transfer and gas dynamics.

EGR 584 Convective Heat Transfer (4)

Conservation principles. Fluid stresses and flux laws. Laminar and turbulent boundary layers. Internal flow; non-circular cross section, entrylength, asymmetric heating. External flow; variable velocity, injection, specified temperature and heat flux distribution. Temperature dependent fluid properties. Computer solutions. 4 lecture-problems. Prerequisite: Undergraduate course in heat transfer.

EGR 585 Computer Organization (4)

Memory Subsystems: Cache, virtual and interleaved memories. Principles of pipeline processing. Arithmetic and instruction pipeline design. Pipeline scheduling and control. 4 lecture-problems. Preprequisite: EGR 558.

EGR 586 Satellite Communication (4)

Introduction to satellite system configurations and digital communication techniques. Link budget analysis. Bare-band transmission systems. Power efficiency and spectrally efficient modulation techniques for linear and non-linear satellite channels. Coding for error detection and correction. Synchronization systems. Tune division multiplexing, frequency division. Multiplexing techniques. Regenerative satellite systems. 4 lecture-problems. Prerequisite: ECE 405 or equivalent, 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. 4 lecture-problems. Prerequisites: 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. 4 lecture-problems. 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. 4 lecture-problems. Prerequisites: 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. 4 lecture-problems. 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. 4 lecture-problems. 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. 4 lecture-problems. Prerequisite: EGR 535 or consent of instructor.

EGR 599 Special Topics for Graduate Students (2–4)

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 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. 4 seminar-discussions. Prerequisite: EGR 511. Unconditional standing requirement.

EGR 624 Advanced Aerospace Vehicle Design (2)

Completion of the design of an interdisciplinary aerospace vehicle system. Preparation of a final report on the project together with an oral briefing to an industrial design review panel. 2 three-hour laboratories. Prerequisite: EGR 524. Unconditional standing requirement.

EGR 632 Computational Fluid Dynamics (4)

Fundamentals of finite-difference methods: partial differential equations, difference representation, stability, errors. Dynamics of a body moving through a fluid medium. Inviscid fluid flows. Compressible fluid flows. Viscous fluid flows. Secondary flows and flow instabilities. Panel methods. 4 lecture-problems. Prerequisites: EGR 509 and 535. Unconditional standing requirement.

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. 4 seminar-discussions. Prerequisite: EGR 540. Unconditional standing requirement.

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. 4 seminar-discussions. Prerequisites: Upper-division course in control systems and EGR 540. Unconditional standing requirement.

EGR 643 Optimal Control Systems (4)

Selected topics in optimal control theory such as variational calculus; maximum principle; dynamic programming; state estimation and computational methods in optimal systems control. 4 seminar-discussions. Prerequisite: EGR 540. Unconditional standing requirement.

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. 4 seminar-discussions. Prerequisites: Upper-division course in control-systems and EGR 540, or consent of instructor. Unconditional standing requirement.

EGR 685 Advanced Computer Organization (4)

Principles of vector and array processing. Multiprocessor architecture programming and control. Data flow computers and VLSI computations. 4 lecture-problems. Prerequisite: EGR 585. Unconditional standing requirement.

EGR 691 Directed Study (1)

Independent investigation of selected engineering problems under the direction of a graduate faculty member. May be repeated once. Students must register through the Engineering Graduate Studies Office. Unconditional standing required.

EGR 695 Master's Degree Project (2)

Independent investigation intended to be an application of an already existing body of knowledge to a specific problem, directed by a commitee of graduate faculty members. Must be repeated as appropriate. Students must register through the Engineeering Graduate Studies Office. Credit assigned upon successful completion of entire project and approval of the committee. Total credit, either 4 or 6 units. Advancement to Candidacy required.

EGR 696 Master's Degree Thesis (2)

Independent investigation intended to be an extention of an existing body of knowledge into an area not thoroughly investigated before, directed by a committee of graduate faculty members, and resulting in a published thesis. Must be repeated as appropriate. Students must register through the Engineering Graduate Studies Office. Credit assigned upon successful completion of entire thesis and approval of the committee. Total credit, 4, 6, 8, or 9 units. Advancement to Candidacy required.

EGR 697 Comprehensive Examination (1) (Credit/No Credit)

An examination on the subject areas of the student's breadth and technical specialty coursework listed on the Program of Study. May be repeated once. Students must register through the Engineering Graduate Studies Office. Offered during Winter and Spring quarters only. Advancement to Candidacy required.

EGR 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis, project or comprehensive examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy requirement.

ENGLISH

Master of Arts in English

In the Department of English and Foreign Languages, College of Arts

Victor N. Okada, *Chair*

Joseph H. Stodder, *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/her 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 an unconditional student in the Master of Arts program in English, 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/her undergraduate program must be at least 3.0 (B). A student who does not meet these requirements may request special consideration for admission as a conditional student.

Admission to the Master of Arts 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 (3.0). No grade below C (2.0) will be accepted to meet this requirement.

Requirements and Curriculum

1. Foreign Language

A student in the M.A. in English program 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 students, therefore, are requested to consult with their advisors about the foreign language requirement.

2. Advancement to Candidacy/Comprehensive Examination

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted upon the recommendation of the graduate faculty and implies a readiness to attempt to successfully complete the final comprehensive examination, both written and oral, which is the culminating experience for the degree.

The Graduation Writing Test (GWT) must have been passed prior to Advancement to Candidacy.

3. Course Work

A grade point average of 3.0 (B) or better must be maintained in all upper-division undergraduate and all graduate courses.

No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.

The candidate must be enrolled in the university during the quarter of graduation.

The student will complete 45 units as follows:

Required Course — *UNITS*

ENG 500 Introduction to Graduate Research 4

Alternate Requirements—24 units

The student's program must show 8 units in each of Groups I and II and 8 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 8

ENG 551, 552 Studies in English Literature

a. to 1500

b. 1500–1660

c. 1660–1800
d. 19th Century
e. 20th Century

Group II 8
ENG 561, 562 Studies in American Literature
a. - to 1800
b. 19th Century
c. 20th Century

Group III 4
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 4
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—17 units

These may include electives listed under Alternate Requirements above, and
ENG 550 English Seminar 4
ENG 570 Contemporary Literary Theory 4
ENG 580 Seminar in Creative Writing 4
ENG 691 Directed Study 1–4

In consultation with his/her advisor, the student may take a maximum of 8 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 (4)

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. 4 seminar-discussions.

ENG 550 English Seminar (4)

Topics in advanced areas of language or literature. May be repeated for a total of 12 units. 4 seminar-discussions. Prerequisite: Instructor's approval.

ENG 551, 552 Studies in English Literature (4) (4)

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. Both ENG 551 and 552 may be repeated with different content for up to 12 units of credit each. 4 seminar-discussions.

ENG 561, 562 Studies in American Literature (4) (4)

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. Both ENG 561 and 562 may be repeated with different content for up to 12 units of credit each. 4 seminar-discussions.

ENG 570 Contemporary Literary Theory (4)

Study of important topics in contemporary literary theory, focusing on such theorists as Jacques Derrida, Julia Kristeva, Fredric Jameson, and Stanley Fish. 4 seminar-discussions.

ENG 571, 572 Studies in Fiction (4) (4)

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. 4 seminar-discussions.

ENG 573, 574 Studies in Drama (4) (4)

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. 4 seminar-discussions.

ENG 575, 576 Studies in Poetry (4) (4)

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. 4 seminar-discussions.

ENG 577, 578 Studies in Non-fictional Prose (4) (4)

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. 4 seminar-discussions.

ENG 580 Seminar in Creative Writing (4)

Two genres: fiction and non-fiction or poetry and drama. May be repeated for up to 8 units of credit. 4 seminar-discussions. Prerequisite: Approval of submitted manuscript or consent of instructor.

ENG 581, 582 Studies in English Language (4) (4)

Such topics as language as a cultural force, literary tradition approached linguistically, stylistics and poetics, dialects and their social context. 4 seminar-discussions.

ENG 583 The Contemporary American Novel (4)

Structure and theme in the American novel since 1945. Such writers as Bellow, Capote, Malamud, Roth, Styron, Updike. 4 seminar-discussions.

ENG 585 Problems in Teaching English as a Second Language (4)

Theory and practice in the teaching of English language skills to non-native speakers. Readings, observations, and supervised tutoring. 4 seminar-discussions.

ENG 586 Problems in Teaching High School Composition (4)

Practices in the teaching of composition in secondary schools. Readings, observations and sample teaching under supervision. 4 seminar-discussions.

ENG 587 The Teaching of Basic Language Skills (4)

Approaches to the problems of high school and community college students with serious deficiencies in language skills. 4 seminar-discussions. Prerequisite: Consent of instructor.

ENG 588 Problems in Teaching College Freshman Composition (4)

The instruction of composition in the community college classroom. Readings, observations and sample teaching under supervision. 4 seminar-discussions.

ENG 589 Developmental Reading in the Secondary School and Community College (4)

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. 4 seminar-discussions. Prerequisite: Consent of instructor.

ENG 691 Directed Study (1–4)

Independent investigation of selected topics in English under the direction of a graduate faculty member. Students must register through the office of the Graduate Coordinator in English. May be repeated for a maximum of 12 units. Unconditional standing requirement.

ENG 697 Comprehensive Examination (1) (Credit/No Credit)

An examination on areas of special concentration in English Studies as determined by the student in consultation with the Graduate Coordinator in English and other graduate faculty. May be repeated once. Students must register through the office of the Graduate Coordinator in English. Advancement to Candidacy requirement.

ENG 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of the comprehensive examination. The candidate must be enrolled in the university during the quarter in which she/he graduates. Advancement to Candidacy requirement.

LANDSCAPE ARCHITECTURE

MASTER OF LANDSCAPE ARCHITECTURE

In the Department of Landscape Architecture, College of Environmental Design

Kenneth S. Nakaba, *Acting Chair*

Landscape Architecture Graduate Studies Committee

Jeffrey K. Olson, *Chair and Graduate Coordinator*

Timothy R. Day	John T. Lyle	Joan M. Safford
J. Anne Holman	Robert C. Perry, Jr.	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 601, 692, 694, 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 322, LA 423–424, LA 521, LA 552).

Students with degrees in non-design disciplines take a series of preparatory courses designed specifically to meet their needs. The preparatory courses, which begin in summer quarter, will normally require four quarters of study before the student proceeds with regular graduate courses. Completion of the degree program requires six quarters in residence for students with bachelor's degrees in landscape architecture or architecture. Students seeking a first professional design degree will have ten quarters in residence for completion of degree requirements.

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 the program should anticipate frequent field trips as an essential part of their studies. A variety of trips ranging from one week to 10 days duration are usually conducted. Applicants should be prepared to participate in at least two of these major field trips.

ADMISSION TO THE PROGRAM

Admission to the Master of Landscape Architecture program requires an undergraduate grade point average of 3.0 (B) or better. An applicant with an average between 2.5 and 3.0 will be considered for admission if other qualifications can be demonstrated.

Admission as an unconditional graduate student requires a professional design degree (such as landscape architecture or architecture). Applicants with degrees in other disciplines are admitted as conditional graduate students. The conditions of admission are described in the section on Curricular Requirements.

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.

PROGRAM REQUIREMENTS

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted a student upon the recommendation of the graduate faculty and implies a readiness to attempt the project or thesis. Students who are not candidates are not eligible to register for LA 695 or 696.

In order to advance to candidacy for the Master of Landscape Architecture the student must: 1) satisfy all admissions conditions, if any; 2) satisfy the Graduation Writing Test; and 3) with the graduate advisor, develop and

file a program of study and have it approved by the Graduate Studies Analyst, and by the Graduate Coordinator for Landscape Architecture. The curriculum specified in the program may be altered only by written petition, which shall be submitted in accordance with university regulations.

CURRICULAR REQUIREMENTS

1. A minimum of 72 quarter units of graduate work must be completed in the graduate degree program. Prerequisite 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. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.
   A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.
3. The following courses are required for all graduate students in landscape architecture: LA 512, LA 601, LA 602, LA 604, LA 606 (18 units), and LA 695 or 696. Students with a degree in landscape architecture have the option of taking either LA 632 or LA 642 to satisfy degree requirements and may take both courses if it is their preference.
4. In addition to the above, the following courses are required for first professional design degree students: one of the following three courses in history: LA 322, LA 423 or LA 424; LA 509; LA 510; LA 511; LA 521; LA 531; LA 532; LA 541; and both LA 632 and LA 642. Additional courses may be required for students without adequate preparation for graduate study in landscape architecture.
5. Each student must also identify a program elective pattern from the following:
   A. Design: LA 551, LA 552, LA 553 (required only of first professional design degree students); LA 555, LA 556, LA 603, and LA 652 (4 units).
   B. Planning: LA 551, LA 552, LA 553 (required only of first professional design degree students); LA 575 (4 units); LA 576, LA 652 (4 units).
   C. Research/Education: LA 692 (6–12 units); and LA 694 (4 units).
6. Additional elective content is required to satisfy the minimum unit requirements for the Master of Landscape Architecture degree. Courses may be selected from offerings in the College of Environmental Design as well as other colleges.
7. The candidate must be enrolled in the university during the quarter of graduation.

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	4
LA 532	Landscape Construction and Design	4
LA 541	Landscape Planting	4
LA 551	Seminar on the Profession	2
LA 552	Seminar on Theory and Literature	2
LA 553	Seminar on Professional Directions	2
LA 555	Seminar on Human Behavior in the Landscape	2
LA 556	Seminar on Human Behavior and Landscape Design	2
LA 575	Topics in Landscape Architecture	2
LA 576	Seminar on Landscape Planning	4
LA 601	Design Research	4
LA 602	Landscape Design and Natural Processes	6
LA 603	Landscape Design and Human Behavior	5
LA 604	Environmental Analysis	4
LA 606	Ecosystematic Landscape Design	9
LA 632	Landscape Technology	6
LA 642	Plant Ecology and Design	6
LA 652	Graduate Seminar	2
LA 692	Independent Study	1–6
LA 694	Thesis/Project Research	1–4
LA 695	Master's Degree Project	4
LA 696	Master's Degree 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. 3 lecture-discussions; 3 three-hour laboratories.

LA 510 Foundations of Landscape Design (6)

Principles and techniques of environmental design applied to shaping the landscape; development of landscape design skills. 3 lecture-discussions; 3 three-hour laboratories.

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 lecture-discussions; 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. 4 lecture-discussions; laboratory 15 hours to be arranged. 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. 3 lecture-discussions; 1 three-hour laboratory.

LA 531, LA 532 Landscape Construction and Design (4) (4)

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. 2 lecture-discussions; 2 three-hour laboratories.

LA 541 Landscape Planting (4)

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. 2 lecture-discussions; 2 three-hour laboratories. Prerequisite: LA 509 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. 1 two-hour seminar-discussion.

LA 552 Seminar on Theory and Literature (2)

Review and analysis of the existing body of literature concerning landscape architecture, relationships between humans and the natural environment, and humans and the designed environment. 1 two-hour seminar-discussion.

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. 1 two-hour seminar-discussion. 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. 1 two-hour seminar-discussion.

LA 556 Seminar on Human Behavior and Landscape Design (2)

Analysis and discussion of design theory and application as a response to human needs and behavior. 1 two-hour seminar-discussion. Prerequisite: LA 555.

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. 1 two-hour lecture-discussion.

LA 576 Seminar on Landscape Planning (4)

Investigation and discussion of political, economic, social and institutional influences on planning decisions and policy formulation with particular concentration on issues related to the natural environment. 1 four-hour seminar-discussion.

LA 601 Design Research (4)

Investigation and discussion of basic research methods; development of design research techniques and skills. 2 two-hour lecture-discussions. Prerequisite: LA 512 or permission of instructor. Unconditional standing requirement.

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. 3 lecture-discussions; 3 three-hour laboratories. Prerequisite: LA 512. Unconditional standing requirement.

LA 603 Landscape Design and Human Behavior (5)

Application of approaches to the determination, satisfaction and expression of human needs in the shaping of space for human use and habitation. 2 lecture-discussions; 3 three-hour laboratories. Prerequisite: LA 556. Unconditional standing requirement.

LA 604 Environmental Analysis (4)

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. 3 lecture-discussions; 1 three-hour laboratory. Prerequisite: LA 512 or permission of instructor. Unconditional standing requirement.

LA 606 Ecosystematic Landscape Design (9)

Application of the ecosystematic approach to complex large-scale problems of landscape design and natural resource planning. May be repeated. Maximum credit 18 units. 3 lecture-discussions; laboratory, 18 hours to be arranged. Prerequisite: LA 602 or permission of instructor. Unconditional standing requirement.

LA 632 Landscape Technology (6)

Application of modern technology to landscape construction involving adaptation of the landscape for human purposes. 3 lecture-discussions; 3 three-hour laboratories. Prerequisites: LA 532 and LA 512 or degree in landscape architecture. Unconditional standing requirement.

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. 3 lecture-discussions; 3 three-hour laboratories. Prerequisites: LA 541 and LA 512 or degree in landscape architecture. Unconditional standing requirement.

LA 652 Graduate Seminar (2)

Seminar presentations and discussion of work in progress by graduate students. May be repeated. Maximum credit 4 units. 1 two-hour seminar-discussion. Unconditional standing requirement.

LA 692 Independent Study (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, 12 units. Unconditional standing requirement.

LA 694 Thesis/Project Research (1–4)

Research conducted as part of the preparation for writing a thesis or preparing a graduate project. Open only to unconditional graduate students with the approval of the graduate advisor. Course may be repreated. Maximum credit, 4 units. Prerequisites: LA 601 and LA 692. Unconditional standing requirement.

LA 695 Master's Degree 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. Advancement to Candidacy requirement.

LA 696 Master's Degree 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. Advancement to Candidacy requirement.

LA 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis or project. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy requirement.

MATHEMATICS

Master of Science in Mathematics

In the Department of Mathematics, College of Science

V. Merriline Smith, *Chair*

J. Scott Sportsman, *Coordinator, Graduate Program*

There are two programs for the Master of Science in Mathematics. The Pure Mathematics Program is for individuals whose principal interest is pure mathematics. It is intended for students who are interested in either further graduate study or in attaining the teaching credential for the community college. The Applied Mathematics Program is intended for students who wish to learn the applications of mathematics, in particular with a goal of working in industry. This program is also appropriate for the individual seeking the community college teaching credential.

Admission to the Program

An applicant for admission 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 in mathematics. 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. Applicants for the Pure Mathematics Program must have course work which includes MAT 314, MAT 315, MAT 417, MAT 418 and MAT 428 (or their equivalent). Applicants for the Applied Program must have course work which includes MAT 314, MAT 315, MAT 417 and MAT 428 (or their equivalent). Work experience, as well as undergraduate course work, may be taken into account by the Graduate Committee for credit towards the admission of an applicant.

An upper-division grade point average of at least 3.0 is required for admission as an unconditional 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 program will be based upon his/her undergraduate preparation, current interests in mathematics, occupational and professional goals. During the first quarter of residence, each unconditional graduate student will prepare a contract in consultation with the graduate coordinator. This will define all courses and requirements which the student must fulfill to earn the degree. Once approved by the College of Science and verified by the Graduate Studies Office, the study list may be amended only by petition, as outlined in the appropriate sections of this catalog.

Advancement to Candidacy

Advancement to candidacy is required of all students who register for MAT 696 (thesis) or 697 (comprehensive exam). In order to advance to candidacy, a student must:

1. Have an overall GPA of at least B (3.0);
2. Satisfy the GWT requirement;
3. Satisfy all requirements stipulated by the graduate coordinator at the time of admission;
4. Have a contract approved by the graduate coordinator;
5. Complete at least 6 courses which appear on the student's contract, 4 of which must be at the 500 level; and
6. Have at least a B (3.0) average on contract courses taken.

Requirement

1. Applied Mathematics Program: At least 45 units of acceptable graduate work must be completed in the master's degree program. At least 33 of these units shall be in courses at the graduate level. A thesis is required.
2. Pure Mathematics Program: Either a thesis or a comprehensive examination is required. Those students who take the comprehensive exam must complete at least 48 units of acceptable graduate work in the master's degree program. At least 36 of these units shall be in courses at the graduate level. Those students who write a thesis must complete at least 45 units of acceptable graduate work in the master's degree program. At least 33 of these units shall be in courses at the graduate level.
3. No more than 13 units of acceptable graduate credit may be transterred from another graduate institution. No more than 13 units taken through Extension (400- level only) may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.
   A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.

4. A grade-point average of at least 3.0 shall be maintained in all course work taken to satisfy the degree requirements, as well as in all courses taken at Cal Poly since the bachelor degree which number 300 or more.
5. The candidate must be enrolled in the university during the quarter of graduation.

Curriculum for Pure Mathematics

The student is required to complete 6 of the following 7 courses: MAT 511, MAT 512, MAT 517, MAT 518, MAT 521, MAT 528, MAT 529. In addition, either a thesis or comprehensive examination is required.

Electives can be graduate or senior level mathematics courses other than MAT 417, MAT 418, MAT 428, MAT 429, MAT 491, and MAT 492.

Curriculum for Applied Mathematics

Required courses are MAT 508, 511, 512, 545 and the completion of three sequences from the list MAT 508 and 509, MAT 545 and 546, MAT 570 and 580, and STA 530 and 584. In addition, the thesis is required.

Electives can be graduate or senior level mathematics courses other than MAT 417, MAT 418, MAT 428, MAT 491 and MAT 492.

Graduate Course Descriptions

MAT 508 Numerical Linear Algebra (4)

Topics will include numerical methods for determinants, systems of linear equations (direct and iterative methods), matrix inversions, eigenvalues, eigenvectors, techniques to minimize error propagation, splittings, rates of convergence of methods. 4 lecture-problems. Prerequisites: "C" or better in MAT 208, MAT 315 and MAT 401 or consent of instructor.

MAT 509 Error Analysis (4)

Topics will include sources of error, types of error, error propagation, techniques for minimizing error, backward error analysis, approximation of functions, error analysis of iterative methods for non-linear equations. 4 lecture-problems. Prerequisites: "C" or better in MAT 401 and 402 or consent of instructor.

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, applications. 4 lecture-discussions. Prerequisite: "C" grade or better in MAT 315 or consent of instructor.

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. 4 lecture-discussions. Prerequisite: "C" grade or better in MAT 418 or consent of instructor.

MAT 521 Topology (4)

Topological spaces, connectedness, compactness, continuity, separation and countability axioms, metric spaces, product spaces, function spaces and quotient spaces, uniform spaces, paracompactness. 4 lecture-discussions. 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 Picard's theorem, gamma and zeta functions. 4 lecture-discussions. Prerequisite: MAT 314 or 428, or consent of instructor.

MAT 535 History of Mathematics (4)

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. 4 lecture-discussions. Prerequisite: Consent of instructor.

MAT 545, 546 Modeling (4) (4)

Modeling of deterministic systems and random processes using ordinary and partial differential equations. Fourier methods, general modeling principles and techniques, perturbation theory and sensitivity analysis, applications. 4 lecture-problems. Prerequisite: Consent of instructor.

MAT 550 Seminar in Mathematics (1–4)

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. May be repeated for a maximum of 8 units. 1–4 seminar-discussions. Prerequisite: Consent of instructor.

MAT 570 Graphs and Network Flows (4)

Matching theory in graphs and network flows in capacity-constrained networks. Major topics include the Konig-Egervary Theorem for bipartite graphs and the Maximal Flow Algorithm for networks, along with a wide variety of applications. 4 lecture-problems. Prerequisite: MAT 370 or consent of the instructor.

MAT 580 Optimization Theory and Applications (4)

Topics will include convex sets, extrema of functions, convex functions, non-linear convex, quadratic and dynamic programming, applications, primal-dual methods for solving constrained problems, applications to large scale mathematical programming problems. 4 lecture-problems. Prerequisite: "C" or better in MAT 480 or consent of instructor.

MAT 599 Special Topics for Graduate Students (1–4)

Topics to be announced in advance. 1–4 lecture-discussions.

MAT 691 Directed Study (1)

Individual reading program in an area chosen by the student under the direction and supervision of the faculty. Maximum of 4 units credit. Students must obtain the written permission of the graduate coordinator in order to register for this course. Unconditional standing required.

MAT 696 Master's Degree Thesis (1)

Independent research and study under supervision of a faculty advisor. Research results must be reported in an acceptable form. Require 3 units credit for thesis. Students must obtain the written permission of the graduate coordinator in order to register for this course. Advancement to Candidacy required.

MAT 697 Comprehensive Examination (1) Credit/no Credit

Preparation for the comprehensive examination. Students must obtain the written permission of the graduate coordinator in order to register for this course. Only applicable with Pure Math option. Advancement to Candidacy required.

MAT 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis. The candidate must be enrolled in the university during the quarter in which he/she graduates. Students must obtain the written permission of the graduate coordinator in order to register for this course. Advancement to Candidacy required.

STA 530 Random Processes (4)

Topics will include second order stationary processes, mean and covariance properties, Gaussian processes, Wiener process and white noise, counting and renewal processes. 4 lecture-problems. Prerequisite: "C" or better in STA 315 or STA 330 or consent of instructor.

STA 550 Probability Theory (4)

Independence, zero-one laws, laws of large numbers, convergence theorems, characteristic functions, and basic limit theorems. Prerequisite: "C" grade, or better, in STA 440, or consent of instructor.

STA 584 Queueing Theory (4)

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: "C" grade, or better, in 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 and Recreation (HPER), College of Arts

Bruce Coulter, *Chair*

Physical Education Graduate Faculty

Ron Deitrick, *Graduate Coordinator*

Stanley Bassin	Otto F.W. Gasser	Wanda Rainbolt
George Eisen	Gus Gerson	Josie M. Sifft
Lynne Emery	G. S. Don Morris	Priscilla F. Stromer
Aubrey Fine	Robert E. Pfister	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 student for the Master of Science in Physical Education will be required to choose among five areas of specialization: Adapted Physical Education; Sport and Recreational Management; Curriculum and Instruction; 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 Sport and Recreational Management is planned to prepare students for positions in commercial health facilities, fitness centers, athletic clubs, and professional sports organizations. The Curriculum and Instruction Specialization focuses on methodology, curriculum development, preparation for college teaching, and evaluation with practical implementation. The Scientific Specialization is designed to prepare students for allied health and exercise science careers including positions as fitness specialists and counselors. It offers a varied theoretical base along with clinical experience in fitness assessment and counseling in addition to many research possibilities. 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 in the university.

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 student with a baccalaureate degree in a major other than physical education may be admitted subject to review of the student's academic background and performance by the departmental Graduate Studies Committee.

An undergraduate grade point average of 3.0 (B) 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 HPER advisor. This assignment will be based upon the student's area of specialization and the thesis topic so that the advisor's expertise will coincide with the student's academic emphasis. The student, with an advisor, 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 and the Graduate Studies Analyst.

Requirements

1. The degree program must include a minimum of 45 quarter units. 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. Six units of required core courses and 9 units in an area of specialization must be included.
2. No more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable graduate credit may be petitioned by an undergraduate student.

A total limit of 13 transfer and/or extension and/or units petitioned for graduate credit may be included in a master's contract.

3. Advancement to Candidacy is granted upon the recommendation of the graduate faculty and implies a readiness of the candidate to 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. The Graduation Writing Test (GWT) must have been passed prior to Advancement to Candidacy.
4. The candidate who chooses to write a thesis must enroll for 9 units of thesis credit and present an oral defense upon completion. The candidate 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.
5. The candidate must be enrolled in the university during the quarter of graduation.

Curriculum

REQUIRED COURSES

		Units
PE 510	Philosophical Bases of Sport and Physical Education	3
PE 590	Research Methods	3
*PE 591	Research Design	3
PE 696	Master's Degree Thesis	9
	OR	
**	Comprehensive Examination	0

* Except in Sport and Recreation Management

** Nine additional elective units required

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

Sport and Recreation Management

PE 550	Problems in Administration of Physical Education	3
PE 552	Theory and Inquiry in Management of Physical Education, Recreation and Athletics	3
PE 655	Legal Aspects of Health, Physical Education, Recreation and Athletics	3

Curriculum and Instruction

PE 553	Curriculum Development in Education	3
PE 555	Evaluating Teacher Effectiveness in Physical Education	3
PE 653	Contemporary Approaches to Physical Education Instruction	3

Scientific Bases of Physical Education

3 of the following five courses:

PE 455	Sports Medicine	3
PE 580	Motor Learning and HumanPerformance	3
PE 583	Motor Development	3
PE 680	Kinesiological Analysis	3
PE 683	Physiology of Exercise	4

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 and Sport	3
PE 545	International 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 advisor.

A list of electives, which includes upper-division and graduate courses in related disciplines is available in the advisor's office.

Graduate Course Descriptions

PE 510 Philosophical Bases of Sport and Physical Education (3)

The development of the philosophies of physical education and the assumptions upon which current professional philosophies rest. 3 lecture-discussions.

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. 3 lecture-discussions. *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. 3 lecture-discussions. *Dr. Eisen.*

PE 543 World History of Physical Education and Sport (3)

The development of physical education and sport from ancient times to the present in both Eastern and Western cultures. Emphasis on the growth and development of physical education and sport in Greece and Rome. 3 lecture-discussions. *Dr. Emery.*

PE 545 International Physical Education and Sport (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. 3 seminar-discussions. *Dr. Emery.*

PE 548 Sport Psychology (3)

Personal characteristics of athletes, coaches, and various sports environs in relation to athletic participation, performance, and learning. 3 lecture-discussions.

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. 3 seminar-discussions. Prerequisite: PE 420.

PE 552 Theory and Inquiry in Management of Physical Education and Athletics (3)

Advanced concepts and theories in organization and management of schools, education institutions and recreation delivery systems. Student inquiry into administrative decision making and personal management styles. 3 seminar-discussions. Prerequisites: REC 320 and 321 or PE 420 or permission of instructor.

PE 553 Curriculum Development in Physical Education (3)

Basic considerations and problems of physical education curricula in secondary schools. 3 lecture-discussions. *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. 3 seminar-discussions.

PE 555 Evaluating Teacher Effectiveness in Physical Education (3)

Strategies and procedures used for evaluating and implementing on-site teacher effectiveness. 3 seminar-discussions.

PE 559 Contemporary Approaches to Physical Education Instruction (3)

Strategies for improving instruction, interpersonal-interaction skills, instruments for measuring teaching outcomes and research studies on teacher effectiveness. 3 seminar-discussion. Prerequisite: PE 553 or permission of instructor.

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. 3 seminar-discussions. *Dr. Anooshian.*

PE 573 Advanced Studies in Therapeutic Recreation (3)

Analysis of therapeutic recreation service. Professional elements comprising therapeutic recreation service, delivery system models, diagnostic and assessment procedures. 3 lecture-discussions. *Dr. Fine.*

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. 3 seminar-discussions. *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. 3 seminar-discussions. Prerequisite: PE 312 or 430.

PE 590 Research Methods (3)

Study the nature of research and the various methods for acquiring information relevant to the profession. 3 lecture-discussions. Prerequisite: STAT 107 or the equivalent.

PE 591 Research Design (3)

Examine the nature and role of applying and interpreting statistical techniques for specific problems related to our professional field. 3 seminar-discussions.

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. 3 seminar-discussions. Prerequisite: Permission of instructor. Unconditional standing requirement.

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. 3 seminar-discussions. Prerequisite: PE 570 or permission of instructor. Unconditional standing requirement.

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. 3 lecture-discussions. Prerequisite: PE 302. *Dr. Gasser.* Unconditional standing requirement.

PE 683 Physiology of Exercise (4)

The physiological and biochemical adjustments made by the body during exercise and changes which result from prolonged periods of intensive physical training. 3 seminar-discussions. 1 two-hour laboratory. Prerequisite: PE 303. *Dr. Deitrick.* Unconditional standing required.

PE 691 Directed Study (2)

A thorough investigation and research of a theme or subject selected by the student in consultation with the faculty. The scholarly research should be undertaken by the initiative of the student but with general guidance and advice from the faculty. Unconditional standing requirement.

PE 696 Master's Degree 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. Prerequisite: PE 591, except for History of Sport and Recreation Management. Advancement to Candidacy requirement.

PE 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis and final oral examination. The candidate must be enrolled in the university during the quarter in which he/she graduates. Advancement to Candidacy requirement.

URBAN AND REGIONAL PLANNING

Master of Urban and Regional Planning

In the Department of Urban and Regional Planning, College of Environmental Design

Charles M. Hotchkiss, *Chair*

Urban and Regional Planning Graduate Studies Committee

Richard W. Willson, *Graduate Coordinator*

Felix R. Barreto, Charles E. Loggins, Ana Maria C. Whitaker
David E. Bess, Siddhartha Sen, Sylvia White

Graduate study in the Department of Urban and Regional Planning leads to the Master of Urban and Regional Planning degree. 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 and regional 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 and Regional 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 and regional planning consultants in the public and private sector following prerequisite work experience; teach urban and regional 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 and Regional Planning program has received recognition by the Planning Accreditation Board.

Admission to the Program

Admission to the Master of Urban and Regional Planning program as an unconditional graduate student requires an undergraduate grade point average of 3.0 (B) or better and completion or waiver of any required preparatory work. 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.

A bachelor's degree in Urban and Regional 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. Students without a background in design or graphics will be required to take URP 501 and 502 as work preparatory to other courses in the program. Waiver of preparatory work in graphics or design can be granted after a review of a portfolio of the applicant's previous work.

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 and Graduate Studies Office.

Urban and Regional Planning Courses taken by Undeclared Students

Courses taken in undeclared postbaccalaureate standing (graduate student coding 3100) will be accepted in fulfillment of degree requirements only if the Graduate Advisor recommends that the Department accept them in the advanced program. Such work taken when the student is not enrolled in the program must average "B" (3.0) or better if the student wishes consideration for unconditional status for the advanced degree.

The Urban and Regional Planning Department may deny enrollment in graduate level courses to undeclared postbaccalaureate students if such enrollment will prevent degree declared students from meeting requirements or may hamper their progress toward the master's degree.

Urban and Regional Planning graduate courses at the 600 level are open only to degree declared students in unconditional status.

Requirements

Seventy-two units must be completed in the graduate degree program. Certain required courses may be substituted 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 more than 13 units of acceptable graduate credit may be transferred from another graduate institution. No more than 13 units taken through Extension may be used on a contract. No more than 13 units of acceptable credit

may be petitioned by an undergraduate student. A limit of a total of 13 transfer and/or extension and/or units petitioned for graduate credit may be included on a master's contract.

No course below the 400 level will be accepted for graduate credit. A grade point average of "B" (3.0) or better must be maintained in all graded course work at this University attempted by degree declared graduate students in the Urban and Regional Planning program, and in all courses used to satisfy degree requirements. A maximum of eight units in required urban and regional planning required courses with the grade of "C" (2.0) will be accepted for credit.

Advancement to Candidacy

Admission to the program does not admit a student to candidacy for a degree. Advancement to Candidacy is granted upon attainment of unconditional status, a passing score on the Graduation Writing Test, successful completion of all courses shown on the student's contract with the exception of courses taken or in support of the thesis or project, and the recommendation of the graduate faculty. Advancement to Candidacy implies a readiness to attempt the thesis or project; students who are not candidates are not eligible to enroll in URP 695 or 696 for a terminal grade.

The terminal thesis or project can be completed in a minimum of two quarters, with a maximum of three units of credit per quarter. Where special conditions exist, permission may be granted allowing completion in three quarters. Enrollment in thesis or project must begin by the first quarter of the seventh year after the first course taken in pursuit of the Master of Urban and Regional Planning degree. In no case will an extension be granted for a thesis or project which is not completed by the end of the seventh year.

An oral defense of the thesis or project is required.

Curriculum

REQUIRED COURSES

		Units
*URP 465	Urban Planning Implementation	4
URP 511	Urban and Regional Planning Theory and Practice	4
URP 512	Urban and Regional Planning Theory and Practice	4
URP 513	Evolution of the Planning Process	4
URP 521	Urban and Regional Planning Research Methods	4
URP 522	Urban and Regional Planning Data Analysis and Simulation	4
URP 534	Urban Housing and Community Development	4
URP 633	Regional, State and National Planning	4
URP 636	Urban Transportation and Circulation Systems	4
URP 641	Graduate Planning Studio I	4
URP 642	Graduate Planning Studio II	4
URP 651	Social and Political Planning Policy	4
URP 652	Planning Administration and Professional Practice	4
URP 695	Master's Degree Project *or*	
URP 696	Master's Degree Thesis	6
Electives		14
Total		72

Students who need to develop their graphic and design skills must take URP 501 (3) and URP 502 (3) immediately upon enrollment. These prerequisite classes are in addition to the 72 units of required courses.

* Students with a bachelor's degree in Urban and Regional 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

URP 501 Graphic Skills for Planning (3)

Introduction to basic planning design techniques. Required of students with degrees in fields outside of Environmental Design to develop fundamental skills necessary for planning. 1 lecture-discussion; 2 three-hour laboratories.

URP 502 Design Skills for Planning (3)

Use of design techniques to solve planning problems. Further development of skills learned in URP 501. Introduction to site planning, urban design, and land development. 1 lecture-discussion; 2 three-hour laboratories. Must be taken immediately following URP 501.

URP 511 Urban and Regional 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 lecture-discussions; 2 seminar-discussions.

URP 512 Urban and Regional Planning Theory and Practice (4)

Application of planning theory to planning practice. Use of planning methods, research techniques, and decision theory in application to a range of urban problems. 2 lecture-discussions; 2 seminar-discussions. Prerequisite: URP 511.

URP 513 Evolution of the Planning Process (4)

Development of urban patterns in the context of planning. Introduction to the history of urban form and the contribution of the planning profession to civic improvement. 4 lecture-discussions.

URP 521 Urban and Regional Planning Research Methods (4)

Introduction to use of probability and statistics in urban and regional 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 lecture-discussions; 1 three-hour laboratory.

URP 522 Urban and Regional Planning Data Analysis and Simulation (4)

Introduction to data analysis and computers. Mathematical models related to land-use, and population projections and estimates. Application of data analysis in the solution of research problems, research design and project management. 3 lecture-discussions; 1 three-hour laboratory. Must be taken immediately following URP 521. Prerequisite: URP 521.

URP 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. 3 lecture-discussions; 1 two-hour activity.

URP 633 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 counties; the future of regional, state, and national planning. 1 lecture-discussion. 1 two-hour activity. Unconditional standing required.

URP 634 International Housing Policy (4)

Institutional factors affecting housing policy. Defines housing problems in an international context. Relates housing problems and goals to the design and management of national policies and issues including, land taxation, financing, self-help and tenure. Explores price and subsidy policy and linkages between housing and national development strategies. 4 seminar-discussions. Unconditional standing required.

URP 636 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. 3 lecture-discussions; 1 three-hour laboratory. Unconditional standing required.

URP 637 Regional Planning for International Development (4)

Theory and methodology of regional planning for international development. Determinants of regional growth, criteria for investment. Regional data collection and analysis. Components of the regional plan for economic development. Intra- and inter-regional distribution and other policy issues. 4 lecture-discussions. Unconditional standing required.

URP 641 Graduate Planning Studio I (4)

Theory, process, design and method for strategic planning demonstrated by studio problems based on field studies. Synthesis of graduate planning coursework reviewed through practical application. 1 lecture-discussion; 9 hours laboratory. Prerequisite: URP 522. Unconditional standing required.

URP 642 Graduate Planning Studio II (4)

Continuation and completion of the plan formulation begun in URP 641. Must be taken immediately following URP 641. 1 lecture-discussion; 9 hours laboratory. Unconditional standing required.

URP 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 lecture-discussions. Prerequisite: URP 511. Unconditional standing requirement.

URP 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. 4 lecture-discussions. Prerequisites: URP 511 and 512. Unconditional standing requirement.

URP 691 Directed Study (1–2)

Independent investigation of an urban and regional planning topic selected by the student preparatory to enrollment in project or thesis and conducted under the direction of a graduate faculty member. May not be taken for credit/no credit. May be repeated for a maximum of 4 units. Unconditional standing required.

URP 695 Master's Degree Project (3)

Development of a terminal research and/or design project on a topic selected by the student, approved by the graduate studies committee and conducted under the direction of a Project Committee chosen by the student. The Project Committee will consist of three graduate faculty members or, with the permission of the Project Committee Chair, two graduate faculty members and a third outside member who has recognized expertise in the subject topic. 6 units required. Advancement to Candidacy required.

URP 696 Master's Degree Thesis (3)

Development of a terminal research report on a topic selected by the student, approved by the graduate studies committee and conducted under the direction of a Thesis Committee chosen by the student. The Thesis Committee will consist of three graduate faculty or, with the permission of the Thesis Committee Chair, two graduate faculty and a third outside member who has recognized expertise in the thesis topic. 6 units required. Advancement to Candidacy required.

URP 699 Master's Degree Continuation (0)

Registration or an approved leave of absence is required for any quarter following the final assignment of the grade SP until the completion of thesis or project. The candidate must be enrolled in the university during the quarter in which she/he graduates. Advancement to Candidacy required.

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(Only full-time tenure track or permanent employees listed.)

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Photoelectronic composition by
CALIFORNIA OFFICE OF STATE PRINTING

90 80388

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