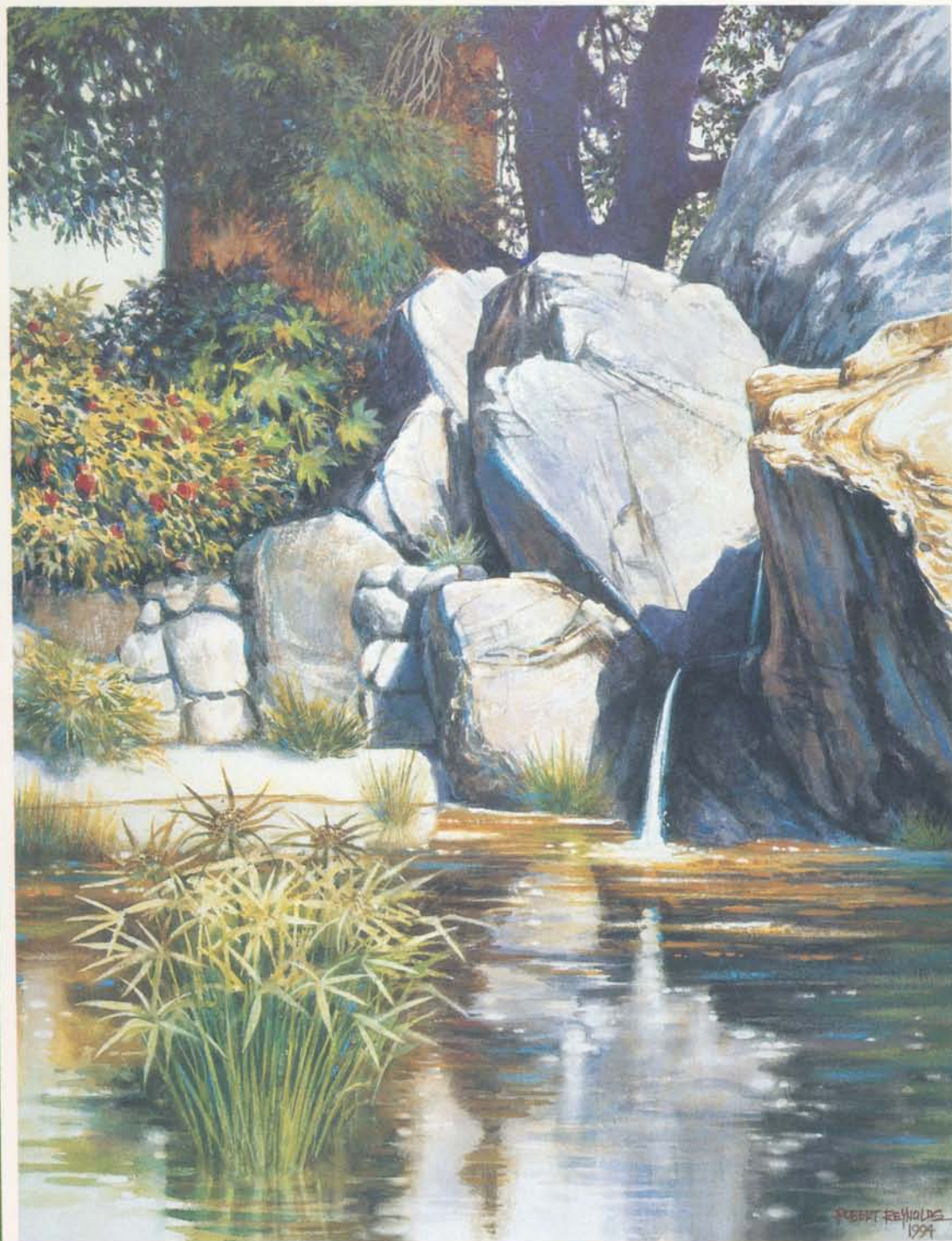


Cal Poly Remembrance Pond



1994-97 CATALOG

CAL POLY



The natural rock formation in 1903, with almost no surrounding vegetation, and a peek of the original Administration Building, giving a hint of a campus that had just opened with 15 students enrolled. A special thanks to the family of Oscar Leslie Heald, the first teacher hired at Cal Poly, for donating this photo.



The same rock formation in 1993 with the new Business Building in the background. It is a park-like setting with a fountain, pond, trees and benches, offering a wonderful study-spot. Photo by Doug Allen.

Cover:

"CAL POLY REMEMBRANCE POND"

In Memory of Wilbur (Ted) Howes

Watercolor 20" x 26 1/2"

March 1994

by Robert Reynolds

ROBERT REYNOLDS, Professor, Cal Poly Art and Design Department.

His paintings are in public and private collections throughout the United States. He is a past recipient of the university's Distinguished Teaching Award and was honored in 1993 with the University President's Art Award. His recently released book, *Painting Nature's Peaceful Places* (North Light Books) is filled with Reynolds' watercolors celebrating his keen vision of nature's special places. Reynolds' work is represented in California by Visions Art Gallery, Morro Bay; the New Masters Gallery, Carmel; and Galerie Iona, Stockton.

CAL POLY REMEMBRANCE POND

The pond was created at the base of the rock formation in the mid-1930's.

In 1953, the pond and surrounding area were dedicated in memory of Ted Howes. Camellias and other shrubs were donated by the California Nurserymen's Association. Students from the OH Club volunteered to do the planting and construction.

WILBUR (TED) HOWES,

Cal Poly Ornamental Horticulture, department head and instructor (1932-1952). In 1940,

Ted was named the first OH department head. He was helpful and inspirational to both Cal Poly students and to California agricultural teachers. *Special thanks to Howard C. Brown, OH (1943-1983), for sharing his knowledge of the Pond and Ted Howes.*

DOUG ALLEN, 1991 Cal Poly graduate, Art and Design, Photography Concentration, produced many of the photos shown in this catalog. Doug is a former staff photographer at Hearst Castle.

1994-1997

CAL POLY

Catalog

CHANGES IN RULES AND POLICIES

Although every effort has been made to assure the accuracy of the information in this catalog, students and others who use this catalog should note that laws, rules, and policies change from time to time and that these changes may alter the information contained in this publication. Changes may come in the form of statutes enacted by the Legislature, rules and policies adopted by the Board of Trustees of The California State University, by the Chancellor or designee of The California State University, or by the President or designee of the institution. Further, it is not possible in a publication of this size to include all of the rules, policies and other information which pertain to the student, the institution, and The California State University. More current or complete information may be obtained from the appropriate department, school, or administrative office.

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THE CATALOG

Copies of the *Catalog* may be purchased at El Corral Bookstore. The price per copy is \$9.15. To order by mail, please call 805-756-1101 or 800-367-0771. The quarterly *Class Schedule* is also available at El Corral Bookstore.

The *Catalog* is prepared in the office of the Associate Vice President for Academic Affairs, Dr. Glenn Irvin. The catalog coordinator is Mary Whiteford. The catalog assistant is Kay Jensen.

Photos by Doug Allen, Joe Codispoti, Stephen Hughes, Rod Neubert, Ray Sanchez and Marty Sconduto.

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TABLE OF CONTENTS

INTRODUCING CAL POLY	5	Health Services	49
The Program	7	Residential Life and Education	49
The Place	11	Psychological Services	50
The History	13	Student Academic Services	50
Guide to Using the Catalog	17	Intercollegiate Athletics Department	52
Academic Calendar	19	ADMISSIONS	54
Academic Programs	22	Undergraduate Application Procedures	54
Enrollment	26	The Admission Process	54
Accreditation	28	Undergraduate Admission Requirements	55
Policies on the Rights of Individuals	29	Freshman Requirements	55
Nondiscrimination Policy	29	Transfer Requirements	56
Sexual Harassment Policy	29	Test Requirements	57
Procedures for Cal Poly	30	Other Admissions Information	57
Gender Harassment	30	Returning Students	57
Statement on Racism and Discrimination	31	Adult Students	57
Statement on Academic Freedom	31	High School Students	57
Campus Student Relations and Judicial Affairs	31	International (Foreign) Student General	
Cheating and Plagiarism	31	Admission Requirements	57
The California State University	32	Determination of Residence for Nonresident	
SPECIAL PROGRAMS AND RESOURCES	36	Tuition Purposes	57
Alumni Association	36	FEES, EXPENSES AND FINANCIAL AID	61
Computing at Cal Poly	36	Fees and Expenses	61
Conferences and Workshops	37	State University Fee	61
Continuing Education in Agriculture	37	Schedule of Fees	61
Extended Education	37	Duplicate Degree Tuition	61
The Foundation	37	Refund of Fees	62
Health Sciences—Preprofessional Preparation	38	Debts Owed to the University	62
Research and Project Involvement	40	Credit Cards	62
Robert E. Kennedy Library	40	Procedure for the Establishment of a Student	
Services to Vocational Agriculture	41	Body Fee	62
Study Abroad Programs	41	Financial Aid	63
Teacher Preparation Programs	42	Typical Student Expenses	63
University Development	43	Alan Pattee Scholarships	63
STUDENT ACTIVITIES AND SERVICES	45	University Scholarships	63
Student Activities	45	Scholarships	64
Associated Students, Inc.	45	Loans	67
Campus Organizations	45	Grants	68
Children's Center	45	State Aid to the Physically Handicapped	68
Craft Center	45	ACADEMIC REQUIREMENTS AND POLICIES	70
Escape Route	45	Academic Placement	70
Fraternities and Sororities	45	English Placement Test (EPT)	70
Galerie	46	Entry Level Mathematics (ELM) Exam	70
Multicultural Center	46	Cal Poly Mathematics Placement Exam (MAPE)	71
Program Board	46	Evaluation of Transfer Credit	71
Recreational Sports	46	Other Academic Credit	71
Rose Float	47	Student Classification	72
Students Serving in the Community	47	General Requirements for the Bachelor's Degree ..	73
Travel Center	47	Choice of Catalog	73
The University Union	47	General Graduation Requirements	73
Week of Welcome	47	Graduation Requirement in Writing Proficiency ...	74
Women's Programs and Services	48	Curriculum Substitution	74
Student Services	48	Change of Major	74
Career Services	48	Double Majors	74
Food Service	49	Second Bachelor's Degree	74

Graduate Credit Taken by Undergraduates	75	Economics.....	169
Honors.....	75	Industrial Technology.....	172
Minors	75	Management.....	176
Commencement	75		
U.S. Cultural Pluralism.....	76	COLLEGE OF ENGINEERING.....	180
General Education and Breadth.....	77	<i>Departments:</i>	
Registration	81	Aeronautical Engineering	188
Class Attendance	81	Civil and Environmental Engineering	193
Holding of Records	81	Computer Engineering	200
Enrollment Status	81	Computer Science	203
Maximum Unit Load.....	81	Electronic and Electrical Engineering	208
Add/Drop	81	Engineering Science	212
Leaves of Absence	81	Industrial and Manufacturing Engineering.....	215
Returning Students	82	Materials Engineering	221
Health Screening	82	Mechanical Engineering.....	224
Grading	83	COLLEGE OF LIBERAL ARTS	228
Grading	83	Women's Studies	230
Grading Symbols	83	<i>Departments:</i>	
Credit/No Credit Grading.....	83	Art and Design	231
Administrative Grading Symbols	83	English.....	234
Repeating a Course	84	Foreign Languages and Literatures	238
Withdrawals / Renewal	85	Graphic Communication.....	240
Academic Standards	85	History.....	243
Academic Obligations.....	85	Journalism	245
Academic Probation and Disqualification	86	Liberal Studies.....	247
Administrative-Academic Probation or		Music	250
Disqualification	86	Philosophy	252
Eligibility for Intercollegiate Athletics	86	Political Science	254
Eligibility for Student Activities.....	87	Psychology and Human Development.....	257
Student Grievance, Conduct, Discipline.....	87	Social Sciences	263
		Speech Communication.....	267
		Theatre and Dance	269
GRADUATE PROGRAMS	89	COLLEGE OF SCIENCE AND MATHEMATICS	272
Admission.....	89	<i>Departments:</i>	
Academic Requirements and Responsibilities	92	Biological Sciences	274
General Policies Governing Graduate Studies.....	92	Chemistry.....	281
		Mathematics	285
COLLEGE OF AGRICULTURE	98	Physical Education and Kinesiology	289
<i>Departments:</i>		Physics	294
Agribusiness	104	Statistics.....	298
Agricultural Education.....	107		
Agricultural Engineering	110	ETHNIC STUDIES.....	301
Animal Science.....	115	UNIVERSITY CENTER FOR TEACHER	
Crop Science.....	117	EDUCATION	303
Dairy Science	122	COURSES	311
Food Science and Nutrition.....	124	FACULTY AND STAFF DIRECTORIES.....	487
Military Science	129	APPENDIX.....	519
Natural Resources Management.....	131	"Student-Right-to-Know" Disclosure of	
Ornamental Horticulture.....	137	Graduation Rate	519
Soil Science	139	Privacy Rights of Students in Education Records.....	519
		Student Discipline.....	519
COLLEGE OF ARCHITECTURE AND		Institutional and Financial Assistance	521
ENVIRONMENTAL DESIGN	143	Average Annual Cost of Education	522
<i>Departments:</i>		INDEX	523
Architectural Engineering.....	144	FOR MORE INFORMATION.....	528
Architecture	146	DIRECTORY	Inside Back Cover
City and Regional Planning.....	150	CAMPUS MAP.....	Inside Back Cover
Construction Management	154		
Landscape Architecture	156		
COLLEGE OF BUSINESS	160		
<i>Departments:</i>			
Accounting	165		
Business Administration.....	167		

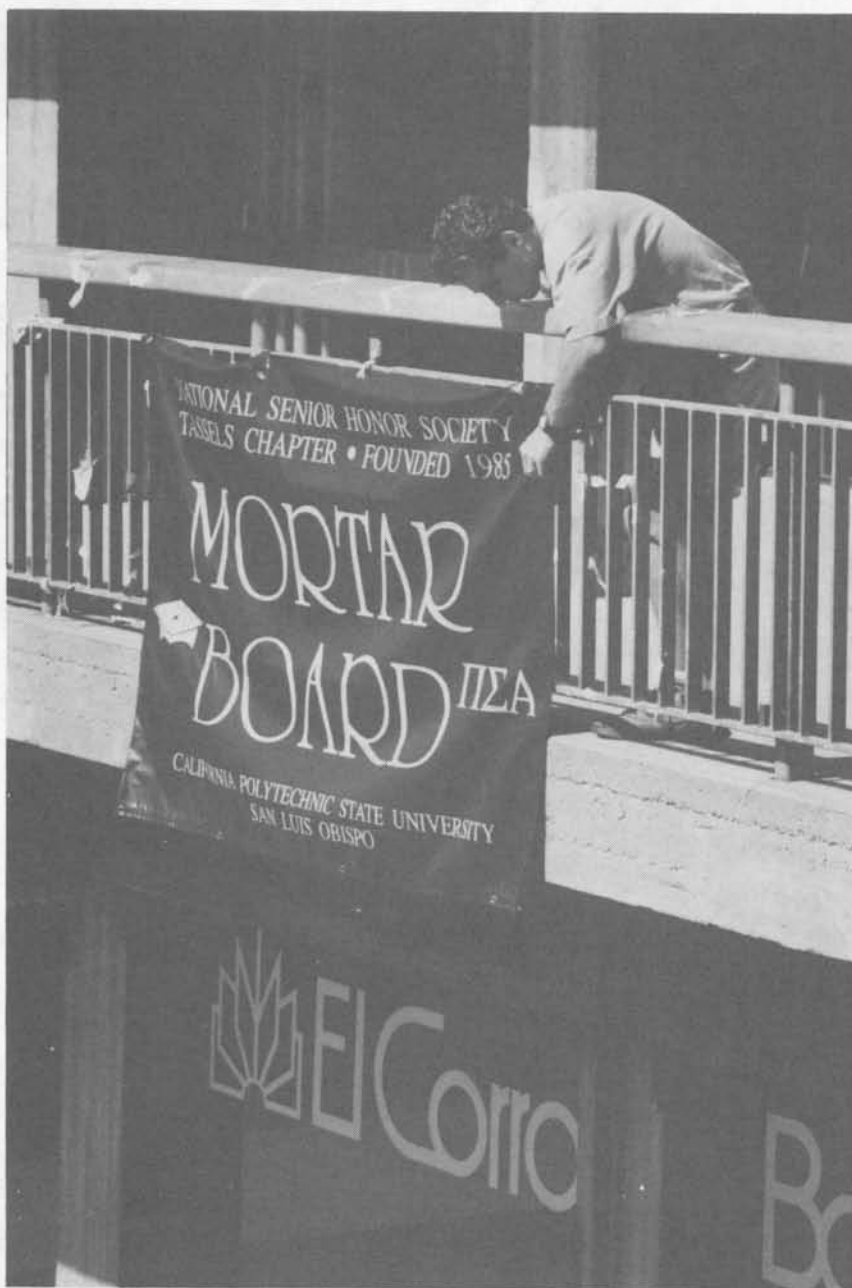
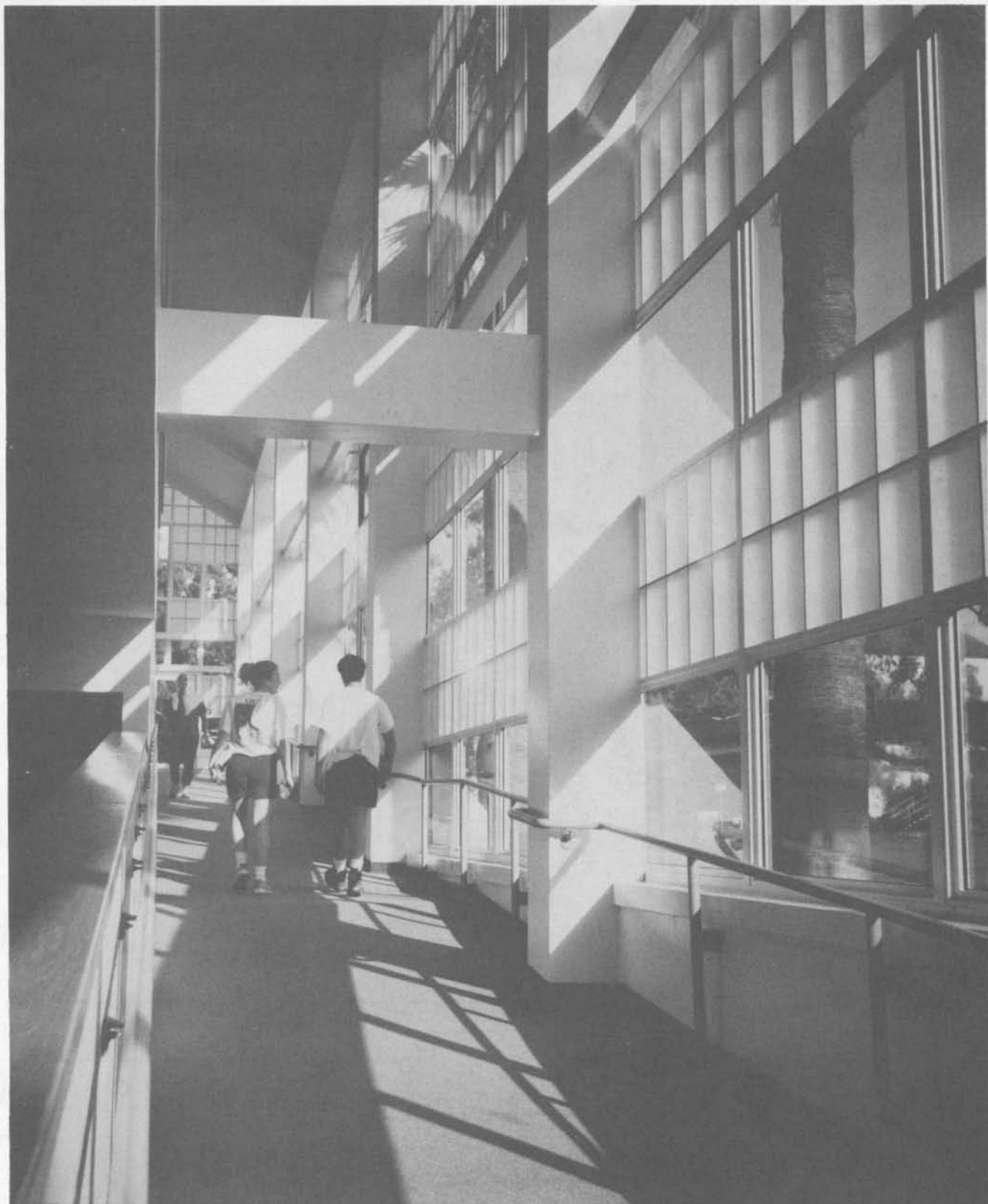


Photo by Doug Allen.

Introducing

CAL POLY



INSIDE THE NEW RECREATION CENTER

Photo by Doug Allen.

THE PROGRAM

CAL POLY IS DIFFERENT

Walk around the Cal Poly campus and look into the corners.

Look into the classrooms, labs, studios and barns.

You find Cal Poly students reading, studying, attending class, of course.

But that's not all. You find them working – rolling up their sleeves and getting their hands dirty.

You find them testing the strength of beams, raising livestock, publishing a newspaper, designing structures, caring for young children, writing computer programs, performing music. You find them machining metal, testing aircraft, auditing books, developing experiments, building all manner of things. In a word, you find them getting *experience* as part of their education.

From row crops to computers, Cal Poly believes the best way for someone to learn something is to *do* it. That's been the school's philosophy since it began.

"Learn by doing," the university calls it.

Cal Poly students gain invaluable first-hand experience both on campus and off. Course work emphasizes it, with a high proportion of lab work, field work and special projects culminating in a senior project. On-campus opportunities such as the daily student-run newspaper and real-world agricultural enterprise projects make hands-on learning a daily reality, not just a catch phrase. Off-campus work with government agencies and major national corporations – for both academic credit and a salary – is available through various programs that include one of the largest Cooperative Education Programs in the Western United States. Many student activities are designed to give students an additional chance to apply what's learned in the classroom.

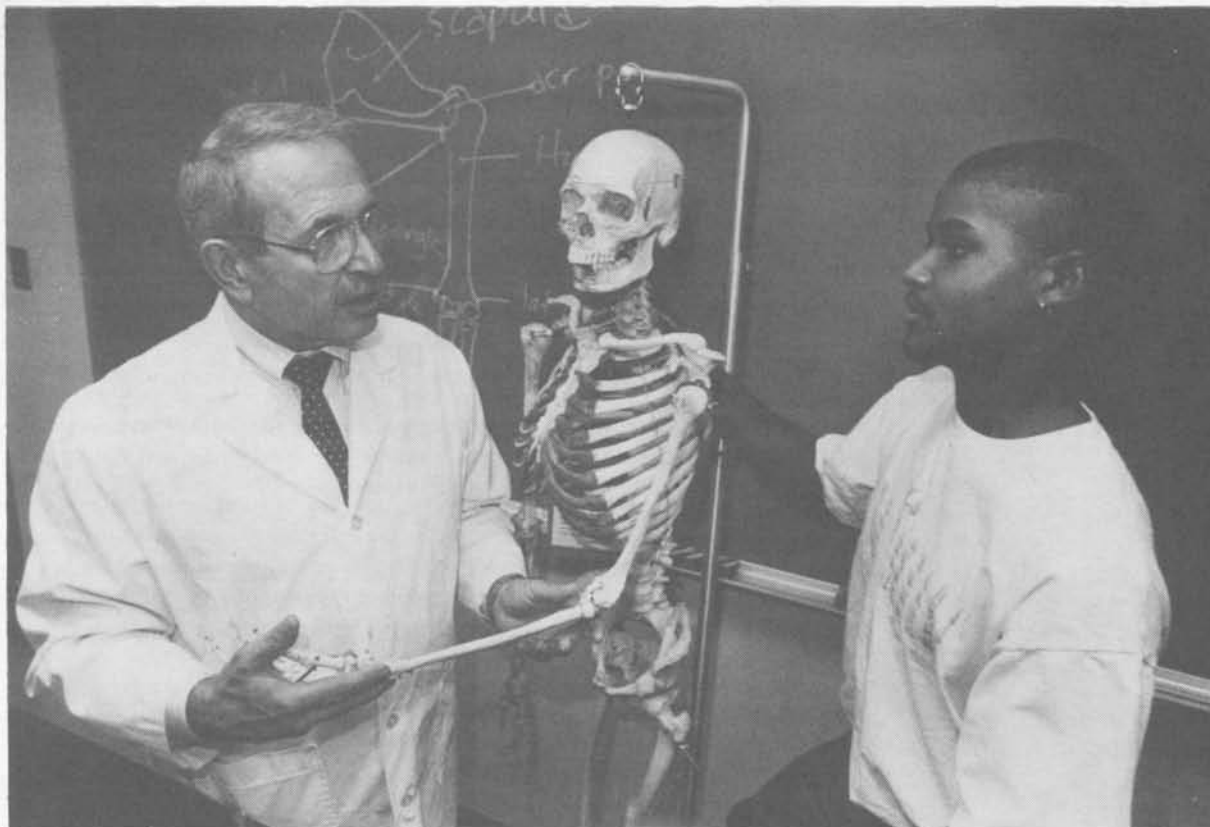
Emphasis on the Undergraduate

Cal Poly is one of 20 campuses in The California State University, the nation's largest four-year university system. Each campus in the CSU system is given considerable freedom in developing its programs, and each has its own special qualities and strengths.

The CSU's emphasis is undergraduate instruction. And Cal Poly's specialty is preparing undergraduates – and preparing them exceptionally well – for careers in applied technical and professional fields.

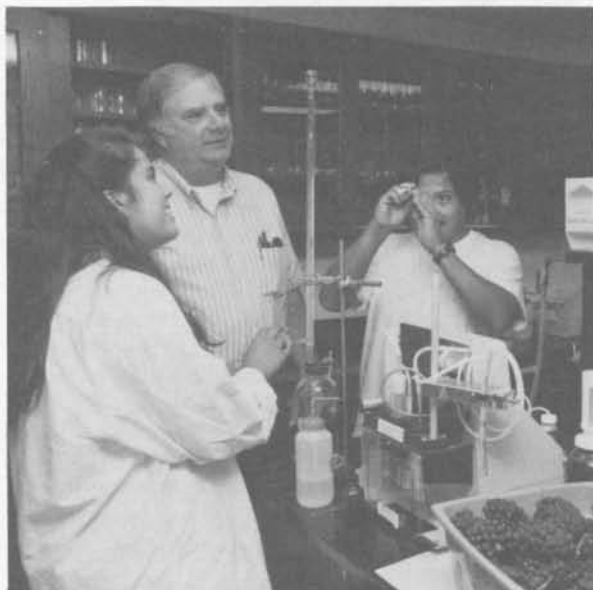
Unlike most universities, Cal Poly requires every prospective student to apply for a particular major field of study, whether seeking to enter from high school or as a transfer student from a community college or another university. Instruction in the major begins on the first day of class.

The difference shows also in the programs. Of the 57 undergraduate majors offered, nine are available within the CSU system only at Cal Poly, and another eight are offered at only one other CSU campus. The university's career orientation is evident in its programs in agriculture, architecture, business, design, education, engineering, graphic communication, and journalism. Those and other professional programs are offered in addition to curricula in the arts, sciences, mathematics and humanities.



HUMAN ANATOMY CLASS

Biology professor, Harry Fierstine, and Mondrick Thompson, biology student, discuss the human skeleton.



FRUIT SCIENCE LAB

Crop Science professor Paul Fountain and students Patricia Saldivar and Jorge Hernandez examine a sample of just-picked grape clusters.
Photo by Doug Allen.



COMPUTERIZED DESIGN

Graphics Communication professor Patrick Munroe instructs student Rebecca Just on the finer points of creating and preparing design for printing using the department's new computerized design system.
Photo by Ray Sanchez.

A Complete Education

And those programs are state-of-the-art education. Many are accredited or recognized at the national level by independent reviewing bodies.

Yet even as it believes in the importance of a practical education, Cal Poly firmly believes that such useful, realistic knowledge must be put into the hands of men and women who possess the maturity, awareness and wisdom to use it well.

Career education at Cal Poly is taught within the framework of a thorough general education that helps students develop fully as educated individuals, not just as trained professionals. Curricula are designed to teach students to think logically, judge critically and communicate clearly. They help give students a sense of responsibility to society, both national and international, and an understanding of their own and other cultures. Just as students in scientific and technical fields learn about the humanities, humanities majors study science and technology.

Overseas study, which can immeasurably broaden a student's knowledge and outlook, is available through year-long CSU programs in 16 countries, as well as through Cal Poly's spring- and summer-quarter London Study Program and a variety of special study programs organized by Cal Poly departments and professors. The university also continues to expand its international involvement through programs involving the faculty and staff as well as students. One example: Cal Poly was chosen by the U.S. Agency for International Development to lead in creating a wholly new agricultural college in Costa Rica.

An Effective Education

In all aspects of education, Cal Poly is committed to excellence. But to measure the quality of its programs, the university doesn't rely on its reputation, national ranking, facilities, applicant test scores or other secondary measures. It looks to the yardstick of educational effectiveness – how good it is at helping students learn, at instilling an appreciation for learning, at developing all of a student's talents, at assessing and improving its teaching.

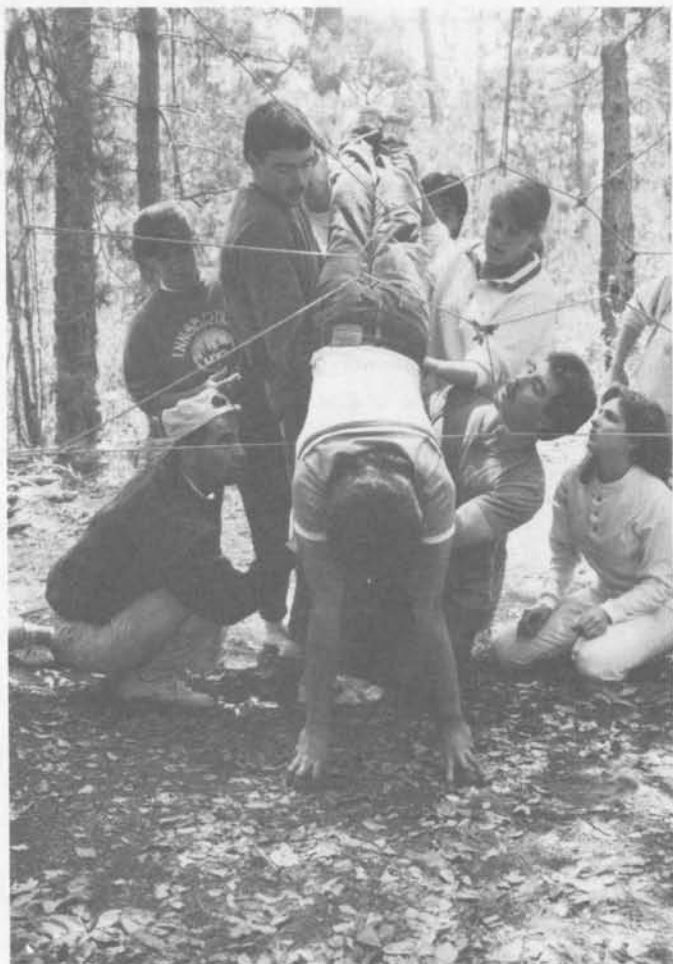
An essential element in helping people learn is getting them involved in what they're learning. From the hands-on orientation of academic courses to the student responsibility built into student activities, Cal Poly evinces a true commitment to student involvement.

A Faculty of Teachers

A university's teachers, of course, are the ones who put the institution's educational principles into practice. Cal Poly's faculty is especially well-chosen to deliver an effective practical education. It's a teaching faculty. Professors give students top priority and individual attention. And Cal Poly faculty members have proved their competence, and continue to develop it, in the world *outside* academia as well – in research, in development, in industry, in the marketplace.

When it selects its faculty, Cal Poly doesn't look at academic qualifications alone. It seeks men and women who are interested in teaching undergraduates, who have records of successful teaching, who are committed to making their teaching even more effective, and whose professional experience shows they have met and mastered the working world their students will face.

With its approach to education and success in applying it, Cal Poly has built a solid statewide and national reputation. The proof of success is the eagerness of recruiters from business and industry to hire Cal Poly graduates, the support well-known corporations have given its programs, and the loyalty of its alumni. The quality of the university's programs attracts students from throughout California and has helped make Cal Poly one of the most popular campuses in the state.



ROPES COURSE

The ASI Chumash Challenge Ropes Course Workshop encourages teambuilding, communication and leadership skills. A cross-section of campus participates in the course, including student government, clubs, faculty and staff. *Photo by Rod Neubert.*



SUMMER SCHOLARS

Mike Flippin, Veronica Marquez, LaShanda Cooper and Josue Cruz, participants in the Summer Scholars Academy of the Minority Access to Health Careers program.



CAREER COUNSELING

Donna Davis, Career Counselor, advises the student how to prepare her resume and with formation of her career plans.

THE PLACE

A FRIENDLY, SMALL-CAMPUS FEELING

Cal Poly is at San Luis Obispo, a pleasant, progressive city of about 44,000 on California's Central Coast, midway between San Francisco and Los Angeles. The city and university share a neighborly, small-campus, small-town feeling and one of the finest natural environments anywhere. Sparkling-clear air and a climate that's temperate year-round blend with majestic peaks, quiet valleys and the nearby ocean to create an exhilarating environment that's ideal for learning and growing.

It's a pleasure to walk around Cal Poly's compact, 400-acre central campus, with its sweeping views of the nearby peaks and valleys. To the north of the academic core is an additional 5,651 acres of rolling campus devoted to student farming, experimental architecture and other outdoor laboratory study, making Cal Poly's one of the largest campuses in the nation.

Instructional facilities are as diverse, specialized and lab-oriented as the instructional programs, and Cal Poly never stops developing new facilities and adapting old ones to include the latest technology in those continually evolving curricula. A prime example is the multimillion-dollar Computer-Aided Productivity Center, funded and equipped in large part by generous donations from industry. It's one of numerous computing facilities available daily to students at all levels in all programs. Other examples among many are a \$4.3 million high-tech dairy instructional facility and the student computer lab in the campus's new Business Building – one of the most sophisticated networking computer labs in the nation.

The university's spacious, modern library contains about 860,000 books and 100,000 bound periodicals, as well as a highly rated government documents collection and other special collections.

For the Necessities, a Choice

Students live both off campus and on. Cal Poly has more residence halls – and more-popular residence halls – than any other CSU campus. They offer a variety of living arrangements for about 2,800 students. Off-campus housing is varied also, including fraternities, sororities and large student-apartment complexes as well as private homes.

Food is available on campus to suit almost any taste and any budget – at two cafeterias, a snack bar, a sandwich shop, a pizza place, an ice cream parlor, a convenience store and a full-service restaurant with a splendid view.

A modern Health Center assures attention to students' medical problems and conducts a variety of preventive programs.

A World of Activities

Possibilities for recreation and other activities are limitless. Cal Poly students join in music, dance, drama, films, fine arts, rodeo, outings, student government and many other opportunities to develop skills and interests. More than 10,000 of Cal Poly's 15,400 students are involved in 350-plus student organizations. And on Pacific beaches, along coastal dunes and ridges, in forests and at nearby lakes, students can enjoy almost any type of recreation, or just relax in an unspoiled natural setting.

Headquarters for on-campus activity is the award-winning University Union. And if you take a close look inside the Union, you might be surprised to find that, to a great extent, students are in charge. At Cal Poly, students bear much of the responsibility for planning and managing activities.

Student-run activities have earned enviable reputations even outside of California. A good example is the animated Rose Parade float designed and built jointly by students from Cal Poly and Cal Poly Pomona. Cal Poly floats consistently win some of the most-coveted prizes in that New Year's Day event.

Cal Poly's reputation for success applies to sports, too. In intercollegiate athletics, the university is completing the transition from NCAA Division II to Division I. In the campus intramurals program, almost 1,000 teams participate in 25 sports open to both men and women. Students also can join more than 30 clubs involved in more-exotic sports like rugby, crew and ultimate Frisbee. Extensive athletic and other recreation facilities are available until late at night. A \$13.5 million recreational sports and events center opened in 1993.

Cal Poly has long been known as a friendly campus that welcomes visitors. Parking permits and campus maps are available on weekdays at the information center at the campus's Grand Avenue entrance. The Administration Building lobby is the starting point for guided campus tours, offered several times a week. For tour days and times, call (805) 756-2792, or write to the University Outreach Services office. Special group tours can be arranged. On weekends, campus maps are available in the University Union (weekend parking doesn't require a permit).

THE HISTORY

A VISION THAT NEVER WAVERED

On a cold rainy day in December of the gold-rush year of 1849, a young West Point drop-out got off a ship in San Francisco and went looking for a job. He'd spent his last cent getting there.

All night he slogged through the muddy streets. But the next morning a man hailed him:

"Say, boy, do you want a job?"

"Yes, sir!"

"Get up on that building and nail on those shingles. I'll give you \$8 a day."

The young man paused.

"Mister, I never drove a nail in my life."

Someone else got the job.

The young man was Myron Angel. By the 1890s he had become a prominent San Luis Obispo resident and chronicler of the county's history, but he hadn't forgotten that inauspicious December morning.

"I could have told the man a great deal I had learned in books," Angel recalled, "but nothing about building a house."

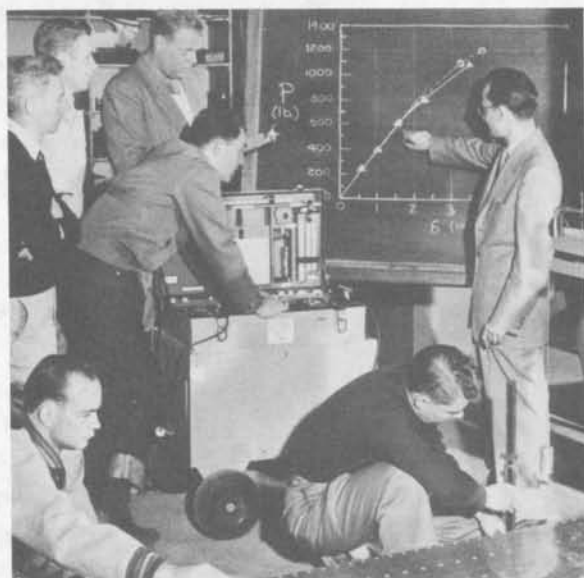
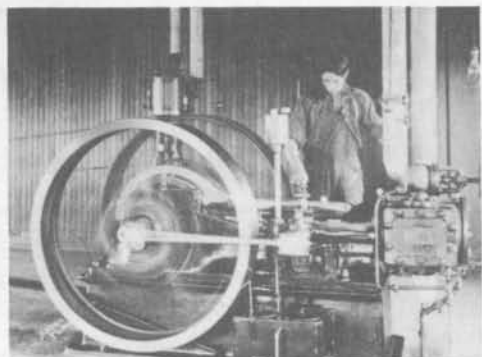
Angel was a leader in a campaign that at first aimed to establish a state "normal" school (a teachers' training school) at San Luis Obispo. But when that prospect dimmed, he shifted his support to the idea of a polytechnic institute, an idea suggested by the district's state senator, Sylvester C. Smith of Bakersfield.

Looking back to his arrival in San Francisco, Angel made an eloquent case for a technical school, and in the same stroke articulated the institution's future: He envisioned a school that would "teach the hand as well as the head, so that no young man or young woman will be sent off in the world to earn their living as poorly equipped for the task as I when I landed in San Francisco in 1849."

In 1901 San Luis Obispo was a farm and rail community of just over 3,000 people. What's now the Cal Poly campus was farm land some distance north of town. The Southern Pacific had just completed the last link in its coastal route and supported the proposal to build a technical school as one way of increasing business for the new line. And it was on March 8 of that first year of the 20th century that legislation founding the California Polytechnic School was signed into law after six years of debate.

The mandate was clear: "To furnish to young people of both sexes mental and manual training in the arts and sciences, including agriculture, mechanics, engineering, business methods, domestic economy, and such other branches as will fit the students for non-professional walks of life."

Born with a New Century



Much has changed in the ensuing years – including the definition of "professional" – as Cal Poly has grown from a vocational high school into a major university. But the essence of that original charge is still part of state law, and Cal Poly has never lost sight of the purpose for which it was created.

Cal Poly's style was clear from the beginning, too.

When 15 young men and women showed up on the first day of class, Oct. 1, 1903, the main building wasn't finished. Construction debris still littered the dormitory. But Director Leroy Anderson, Mrs. Anderson and the students moved in, set to work, and set the example that others are still following.

As the school's director until 1908, Anderson emphasized learning by doing and earning while learning and established once and for all Cal Poly's hands-on approach to its polytechnic subject matter.

From a School to a College

During its first three decades, Cal Poly evolved into the equivalent of a junior college, and governance was transferred from a local board of trustees to the state Board of Education. Then the Depression hit, and hit hard. The Legislature considered abolishing the institution.

But in 1933 Cal Poly got a new start. Julian A. McPhee, chief of the California Bureau of Agricultural Education, agreed to become the school's president. McPhee assumed leadership of what had been reorganized as a two-year technical college offering instruction in agriculture and industrial fields. Enrollment had been limited to men as of 1929.

During the next 33 years, until his retirement in 1966, McPhee guided Cal Poly's transformation. A third year of instruction was added in 1936, a fourth in 1940. Cal Poly's first baccalaureate exercises were held May 28, 1942.

During World War II, the campus was the site of a Naval Flight Preparatory School. After the war, a wave of practical-minded veterans using the G.I. Bill helped inject fresh vigor into the college's programs. The curriculum, facilities and enrollment expanded rapidly.

Cal Poly's name caught up with reality in 1947, as California State Polytechnic School became California State Polytechnic College. In those postwar years the first graduate-level programs were added to the curriculum, and in 1956, coeds returned to the campus.

It was in 1961 that the college became part of the newly formed California State Colleges system (now The California State University). The last years of McPhee's presidency also witnessed new initiatives in several areas, such as in the fledgling field of computing, and an acceleration of international programs. Steadily rising enrollments reached 7,740 in 1966, McPhee's last year at the helm.

It was also in 1966 that Cal Poly's campus at Pomona, founded in 1938 as a branch of the San Luis Obispo school, was made a separate state college by the Legislature.

New Times, New Challenges

Rapid development continued under the 12-year presidency of McPhee's successor, Robert E. Kennedy. The college's popularity and reputation grew as it built solid programs on the solid philosophy of its founders. Then the Legislature recognized what the institution had become: In 1972 California State Polytechnic College was renamed California Polytechnic State University.

When Cal Poly's current president, Warren J. Baker, succeeded Kennedy in 1979, the student body had reached 16,000. The challenges facing the university had become the challenges of broadening and refining programs and facilities to meet the need for an ever-more-sophisticated education in today's rapidly changing and interdependent world. They're the kinds of challenges Cal Poly has always anticipated and met.

As Cal Poly nears the end of its first century, it remains clear in its purpose and proud of its achievements, but never satisfied that it can't be better. It remains a continually evolving institution, but also true to the original vision of a school to "teach the hand as well as the head."

And as Cal Poly rises among the ranks of major American universities, time continues to test and prove the worth of a Cal Poly education. Cal Poly graduates possess the knowledge and skills not just to nail on some shingles as Myron Angel couldn't, but to step right into careers of planning, designing, building, operating and improving whole structures and entire communities, of managing farms and businesses, of developing minds and expanding knowledge – of helping to build a better life in our nation and the world.



Cal Polytechnic State University San Luis Obispo, Cal.

A GUIDE TO USING THE CATALOG

Academic terminology and a university catalog can be confusing to someone first entering the university. This section explains some of the jargon you will quickly come to know and explains briefly how the catalog is organized.

COLLEGES AND DEPARTMENTS

The faculty of Cal Poly is organized into academic departments, and the departments are grouped into Colleges and the University Center for Teacher Education. All of the degree programs offered by the university are described in the catalog. Sections for each College follow in alphabetical order. Departments are arranged alphabetically within the appropriate College.

DEGREES

A **degree** is an academic rank which the university confers on a student who satisfactorily completes a designated curriculum, or program of study. Cal Poly grants undergraduate degrees – also called baccalaureate degrees – and master's degrees, the first graduate degree.

At the undergraduate level, Cal Poly grants the

- * Bachelor of Arts (B.A.),
- * Bachelor of Science (B.S.),
- * Bachelor of Architecture (B.Arch.), and
- * Bachelor of Landscape Architecture (B.L.A.).

At the graduate level, Cal Poly grants the

- * Master of Arts (M.A.),
- * Master of Science (M.S.),
- * Master of Business Administration (M.B.A.), and
- * Master of City and Regional Planning (M.C.R.P.)

Cal Poly doesn't offer programs leading to doctoral degrees.

MAJORS

A **major** is a program of study that provides students with the knowledge, skills and experience necessary to pursue a specific career or advanced study and leads to a degree in that subject. Each major is offered in an academic department.

Cal Poly students select a major at the time they apply for admission. A complete listing of majors, arranged by College and department, may be found on page 22.

General requirements for bachelor's degrees are given in "Academic Requirements," and for master's degrees in "Graduate Programs." The specific requirements for a particular degree program are listed under the academic department that offers the degree.

The curriculum display for each bachelor's degree program shows courses arranged by *Major, Support, General Education and Breadth*, and *Electives*. Some programs also show a curriculum display with the suggested order for taking courses and group them into the traditional four years for an undergraduate program (five years for the B.Arch. and B.L.A.).

These curriculum displays are useful guides, but many students find, for a variety of reasons, that they need more than four years to complete their bachelor's programs. In planning their programs, students should rely on the academic advising available in their departments, as well as on the information in this catalog.

COURSES

Descriptions of Cal Poly courses are located in the back half of the catalog, arranged alphabetically by course prefix (an abbreviation that represents the subject).

The courses in a bachelor's degree curriculum are identified as *major courses, support courses, general education and breadth courses*, and *electives*.

Major courses are designed to provide competence in the professional field in which a degree is earned. They are usually offered by the academic department in which the degree program is offered, but they may include courses from other departments.

Support courses provide background needed for major courses and are usually offered by departments other than the department in which the major is offered. For example, most majors in engineering and in the sciences require support courses in mathematics.

General Education and Breadth (GEB) courses provide a common foundation of knowledge for all undergraduate programs. Cal Poly's GEB course requirements are described in detail on page 77.

Electives are courses that students can choose simply to pursue their own interests.

Course Numbering System

Courses are generally numbered according to the plan shown below.

- 010–099 Nondegree credit or short courses.
- 100–299 Courses primarily for freshman and sophomore students.
- 300–399 Courses primarily for advanced undergraduate students with prerequisite coursework.
- 400–499 Courses for advanced undergraduates. Certain 400-level courses can be used in graduate programs. See page 94.
- 500–599 Graduate courses.
- 600–699 Courses for professional advancement within a special field. They do not carry credit for degree requirements in any of the curricula.

Prerequisites

Prerequisites inform the student of previous coursework needed in preparation for the course. Eligibility of students who do not meet the stated prerequisites is determined by their academic advisers and the appropriate instructor. The instructor may drop a student from the class if the prerequisites have not been met.

Modes of Instruction

The mode of instruction is included in each course description; for supervision courses, no mode is indicated. Some courses have more than one mode of instruction.

Activity classes meet for 2 hours per unit of credit.

Laboratory classes meet for 3 hours per unit of credit.

Lecture classes meet for 1 hour per unit of credit.

Seminar classes meet for 1 hour per unit of credit.

Experimental courses are new courses approved after the publication of the catalog and may be distinguished by an "X" in the course number. Course descriptions appear in the quarterly *Class Schedule*.

CONCENTRATIONS AND SPECIALIZATIONS

A **concentration** is a group of courses designed to provide specialized knowledge within a bachelor's degree program. Completion of a concentration will be noted on the student's transcript, but not shown on the diploma.

A **specialization** is a similarly specialized group of courses in a master's degree program. Completion of a specialization will be noted on the student's transcript, but not shown on the diploma.

MINORS

A **minor** is a group of courses designed to give a student knowledge in an area outside the major. A minor is not required for a degree. For more information and a list of available minors at Cal Poly, see page 75.

QUARTERS AND QUARTER UNITS

Cal Poly's academic calendar consists of four quarters – Fall, Winter, Spring and Summer.

Cal Poly's **academic year** consists of Fall, Winter and Spring quarters.

The **university year** includes, and begins with, Summer Quarter.

Each course offered by the university carries a value in **quarter units**, often referred to simply as units or credits.

To convert semester units to quarter units, multiply by 1.5. For example,

$$6 \text{ semester units} \times 1.5 = 9 \text{ quarter units.}$$

ACADEMIC CALENDAR

Please note: This is not intended to be construed as an employee work calendar. Please refer to the Class Schedule for the 1996-97 Academic Calendar.

SUMMER QUARTER 1994

June 20	Monday	Beginning of university year Beginning of summer quarter Summer quarter classes begin
July 1	Friday	End of second week of instruction Last day to drop a class
July 4	Monday	Academic holiday – Independence Day Observed
July 5	Tuesday	Last day to add a class Last day to register late and pay late registration fee
July 11	Monday	End of third week of instruction – Census date
August 8	Monday	End of seventh week
August 26	Friday	Last day of classes
August 29–September 2	Monday–Friday	Final examination period
September 2	Friday	End of summer quarter
September 3–11	Saturday–Sunday	Academic Holiday

FALL QUARTER 1994

September 12	Monday	Beginning of fall quarter (faculty only)
September 19	Monday	Fall quarter classes begin
September 30	Friday	End of second week of instruction Last day to drop a class
October 3	Monday	Last day to add a class Last day to register late and pay late registration fee
October 7	Friday	End of third week of instruction – Census date
November 4	Friday	End of seventh week of instruction
November 11	Friday	Academic holiday – Veterans' Day
November 23–27	Wednesday–Sunday	Academic holiday – Thanksgiving
December 2	Friday	Last day of classes
December 5–9	Monday–Friday	Final examination period
December 10	Saturday	Mid-Year Commencement
December 11–January 2	Sunday–Sunday	End of fall quarter Academic holiday

WINTER QUARTER 1995

January 3	Tuesday	Beginning of winter quarter Winter quarter classes begin
January 16	Monday	Academic holiday – Martin Luther King, Jr. Birthday Observance
January 17	Tuesday	End of second week of instruction Last day to drop a class
January 18	Wednesday	Last day to add a class Last day to register late and pay late registration fee
January 24	Tuesday	End of third week of instruction – Census date
February 20	Monday	Academic holiday – George Washington's Birthday Observance
February 21	Tuesday	End of seventh week of instruction
March 13	Monday	Last day of classes
March 14–18	Tuesday–Saturday	Final examination period
March 18	Saturday	End of winter quarter
March 19–26	Sunday–Sunday	Academic holiday

SPRING QUARTER 1995

March 27	Monday	Beginning of spring quarter Spring quarter classes begin
April 7	Friday	End of second week of instruction Last day to drop a class
April 10	Monday	Last day to add a class Last day to register late and pay late registration fee
April 14	Friday	End of third week of instruction Census date
May 12	Friday	End of seventh week of instruction
May 29	Monday	Academic holiday – Memorial Day
June 2	Friday	Last day of classes
June 5–9	Monday–Friday	Final examination period
June 10	Saturday	Commencement End of spring quarter
June 11–June 18	Sunday–Sunday	End of university year (faculty only) Academic Holiday

SUMMER QUARTER 1995

June 19	Monday	Beginning of university year Beginning of summer quarter Summer quarter classes begin
June 30	Friday	End of second week of instruction Last day to drop a class
July 3	Monday	Last day to add a class Last day to register late and pay late registration fee
July 4	Tuesday	Academic holiday – Independence Day Observance
July 10	Monday	End of third week of instruction Census date
August 7	Monday	End of seventh week of instruction
August 25	Friday	Last day of classes
August 28–September 1	Monday–Friday	Final examination period
September 1	Friday	End of summer quarter
September 2–17	Saturday–Sunday	Academic holiday

FALL QUARTER 1995

September 11	Monday	Beginning of fall quarter (faculty only)
September 18	Monday	Fall quarter classes begin
September 29	Friday	End of second week of instruction Last day to drop a class
October 2	Monday	Last day to add a class Last day to register late and pay late registration fee
October 6	Friday	End of third week of instruction Census date
November 3	Friday	End of seventh week of instruction
November 10	Friday	Academic holiday – Veterans' Day
November 22–26	Wednesday–Sunday	Academic holiday – Thanksgiving
December 1	Friday	Last day of classes
December 4–8	Monday–Friday	Final examination period
December 9	Saturday	Mid-Year Commencement End of fall quarter
December 10–January 1	Sunday–Monday	Academic holiday

WINTER QUARTER 1996

January 2	Tuesday	Beginning of winter quarter Winter quarter classes begin
January 15	Monday	Academic holiday – Martin Luther King, Jr. Birthday Observance
January 16	Tuesday	End of second week of instruction Last day to drop a class
January 17	Wednesday	Last day to add a class Last day to register late and pay late registration fee
January 23	Tuesday	End of third week of instruction Census date
February 20	Monday	Academic holiday – George Washington's Birthday Observance
February 21	Tuesday	End of seventh week of instruction
March 11	Monday	Last day of classes
March 12–16	Tuesday–Saturday	Final examination period
March 16	Saturday	End of winter quarter
March 17–24	Sunday–Sunday	Academic holiday

SPRING QUARTER 1996

March 25	Monday	Beginning of spring quarter Spring quarter classes begin
April 5	Friday	End of second week of instruction Last day to drop a class
April 8	Monday	Last day to add a class Last day to register late and pay late registration fee
April 12	Friday	End of third week of instruction Census date
May 10	Friday	End of seventh week of instruction
May 27	Monday	Academic holiday – Memorial Day
May 31	Friday	Last day of classes
June 3–7	Monday–Friday	Final examination period
June 8	Saturday	Commencement End of spring quarter
June 9–16	Sunday–Sunday	End of university year (faculty only) Academic Holiday

SUMMER QUARTER 1996

June 17	Monday	Beginning of university year Beginning of summer quarter Summer quarter classes begin
June 28	Friday	End of second week of instruction Last day to drop a class
July 1	Monday	Last day to add a class Last day to register late and pay late registration fee
July 4	Thursday	Academic holiday – Independence Day
July 8	Monday	End of third week of instruction Census date
August 5	Monday	End of seventh week of instruction
August 16	Friday	Last day of classes
August 26–August 30	Monday–Friday	Final examination period
August 30	Friday	End of summer quarter
August 31–September 15	Saturday–Sunday	Academic Holiday

ACADEMIC PROGRAMS

<i>Colleges and Departments</i>	<i>Curricula with Concentrations</i>	<i>Degrees, Minors</i>
College of Agriculture	Agriculture	M.S.
	Specializations:	
	Agricultural Engineering Technology	
	Dairy Products Technology	
	Food Science and Nutrition	
	General Agriculture	
	International Agricultural Development	
	Soil Science	
Agribusiness Department	Water Science	Minor
	Agricultural Business	B.S., Minor
	Concentrations:	
	Agribusiness Finance and Appraisal	
	Agribusiness Marketing	
	Agribusiness Policy	
	Farm and Ranch Management	
Agricultural Education Department	Agricultural Science	B.S.
	Concentrations:	
	Agricultural Mechanics	
	Agricultural Products and Processing	
	Agricultural Resources Management	
	Agricultural Supplies and Services	
	Animal Production	
	Ornamental Horticulture	
	Plant Production	
Agricultural Engineering Department	Agricultural Engineering	B.S.
	Agricultural Systems Management	B.S.
Animal Sciences Department	Animal Science	B.S.
	Poultry Management	Minor
Crop Science Department	Crop Science	B.S.
	Fruit Science	B.S.
	Plant Protection Science	B.S., Minor
Dairy Science Department	Dairy Science	B.S.
Food Science and Nutrition Department	Food Science	B.S., Minor
	Nutritional Science	B.S., Minor
Military Science Department		
Natural Resources Management Department	Forestry and Natural Resources	B.S.
	Concentrations:	
	Environmental Management	
	Forest Resources- Management	
	Forest Resources- Urban Forestry	
	Forest Resources- Watershed, Chaparral, and Fire Management	
	Parks and Forest Recreation	
	Recreation Administration	B.S.
	Concentrations:	
	Commercial/Tourism Management	
	Parks and Forest Recreation	
Ornamental Horticulture Department	Ornamental Horticulture	B.S.
Soil Science Department	Soil Science	B.S.
	Concentrations:	
	Environmental Management	
	Environmental Science and Technology	
	Land Resources	

<i>Colleges and Departments</i>	<i>Curricula with Concentrations</i>	<i>Degrees, Minors</i>
College of Architecture and Environmental Design		
Architectural Engineering Department	Architectural Engineering	B.S.
Architecture Department	Architecture <i>Specializations (for M.S.):</i> Environmental Design Professional Practice	B.Arch., M.S.
City and Regional Planning Department	City and Regional Planning City and Regional Planning/Engineering <i>Specialization: Transportation Planning</i>	B.S., M.C.R.P. M.C.R.P./M.S.
Construction Management Department	Construction Management	B.S.
Landscape Architecture Department	Landscape Architecture <i>Concentrations:</i> Environmental Design Recreation and Open Space Regional Landscape Assessment	B.S.
College of Business		
	Business Administration <i>Specialization: Agribusiness</i>	M.B.A.
	Business Administration/Engineering <i>Specialization: Engineering Management</i>	M.B.A./M.S.
Accounting Department	Business Business Administration <i>Concentration: Accounting</i>	Minor B.S.
Business Administration Department	Business Administration <i>Concentrations:</i> Financial Management Marketing Management	B.S.
Economics Department	Economics <i>Concentrations:</i> Business and Industrial Economics International Trade and Development Quantitative Economics	B.S., Minor
Industrial Technology Department	Industrial and Technical Studies Industrial Technology Vocational Education Integrative Technology Packaging	M.A. B.S. B.V.Ed. Minor Minor
Management Department	Business Administration <i>Concentrations:</i> Human Resources Management International Business Management Management Management Information Systems Production and Operations Management	B.S.
College of Engineering		
	Business Administration/Engineering <i>Specialization: Engineering Management</i>	M.B.A./M.S.
	City and Regional Planning/Engineering <i>Specialization: Transportation Planning</i>	M.C.R.P./M.S.
	Engineering <i>Specializations:</i> Biochemical Engineering Industrial Engineering Materials Engineering Mechanical Engineering Water Engineering	M.S.
	Engineering Science	B.S.

<i>Colleges and Departments</i>	<i>Curricula with Concentrations</i>	<i>Degrees, Minors</i>
College of Engineering (continued)		
(College of Agriculture, Agricultural Engineering Department)	Agricultural Engineering	B.S.
Aeronautical Engineering Department	Aeronautical Engineering <i>Concentrations (for B.S.):</i> Aeronautics Astronautics	B.S., M.S.
Civil and Environmental Engineering Department	Civil Engineering Environmental Engineering Civil and Environmental Engineering	B.S. B.S. M.S.
Computer Engineering Computer Science Department	Computer Engineering Computer Science	B.S. B.S., M.S., Minor
Electronic and Electrical Engineering Department	Electrical Engineering	B.S., M.S.
Industrial and Manufacturing Engineering Department	Industrial Engineering Manufacturing Engineering Integrative Technology	B.S. B.S. Minor
Materials Engineering Department	Materials Engineering	B.S.
Mechanical Engineering Department	Mechanical Engineering	B.S.
College of Liberal Arts		
Art and Design Department	Values, Technology and Society	Minor
	Women's Studies	Minor
	Applied Art and Design	B.S.
	<i>Concentrations:</i> Graphic Design Photography	
English Department	Art English Linguistics	Minor B.A., M.A., Minor Minor
Foreign Languages Department	French German Spanish	Minor Minor Minor
Graphic Communication Department	Graphic Communication <i>Concentrations:</i> Computers and Printing Technology Design Reproduction Technology Printing Management	B.S., Minor
History Department	History	B.A., Minor
Journalism Department	Journalism	B.S.
Liberal Studies	Liberal Studies	B.A.
Music Department	Music	B.A., Minor
Philosophy Department	Philosophy	B.A., Minor
Political Science Department	Political Science <i>Concentrations:</i> International Affairs Pre-Law Public Administration Teaching Urban Studies	B.A.
Psychology and Human Development Department	International Relations	Minor
	Public Administration	Minor
	Human Development <i>Concentrations:</i> Applied Developmental Psychology Applied Family Psychology Applied Social Psychology Early Childhood Education	B.S.
	Psychology Gerontology	M.S., Minor

Enrollment in Programs by College and Major, Fall 1993

<i>Colleges and Major Curricula</i>	<i>Undergrad</i>	<i>Grad.</i>	<i>Men</i>	<i>Women</i>	<i>Total</i>
College of Agriculture					
Agriculture (M.S.)	—	53	19	34	53
Agricultural Education/Science	130	—	56	74	130
Agricultural Engineering	162	1	139	24	163
Agricultural Engineering Technology	79	—	77	2	79
Agricultural Business	814	—	479	335	814
Animal Science	419	4	138	285	423
Crop Science	149	1	118	32	150
Dairy Science	96	1	62	35	97
Food Science	133	1	50	84	134
Forestry and Natural Resources	238	1	170	69	239
Fruit Science	46	1	27	20	47
Home Economics	181	—	3	178	181
Natural Resources Management	54	—	43	11	54
Nutritional Science	332	5	45	292	337
Ornamental Horticulture	265	3	149	119	268
Plant Protection Science	16	—	10	6	16
Poultry Industry	9	—	6	3	9
Recreation Administration	174	—	68	106	174
Soil Science	<u>153</u>	<u>2</u>	<u>100</u>	<u>55</u>	<u>155</u>
Totals	3,450	73	1,759	1,764	3,523
College of Architecture and Environmental Design					
Architectural Engineering	268	—	180	88	268
Architecture	650	41	406	285	691
City and Regional Planning	144	28	113	59	172
Construction Management	236	2	214	24	238
Landscape Architecture (B.S.)	145	10	94	61	155
Landscape Architecture (B.L.A.)	<u>0</u>	<u>1</u>	<u>16</u>	<u>15</u>	<u>31</u>
Totals	1,473	82	1,023	532	1,555
College of Business					
Business Administration	1,367	83	770	680	1,450
Economics	103	—	71	32	103
Industrial and Technical Studies (M.A.)	—	18	16	2	18
Industrial Technology	267	—	234	33	267
Vocational Education	—	—	—	—	—
Engineering Management (M.B.A./M.S.)	<u>—</u>	<u>3</u>	<u>3</u>	<u>—</u>	<u>3</u>
Totals	1,737	104	1,094	747	1,841
College of Engineering					
Aeronautical Engineering	272	24	242	54	296
Civil and Environmental Engineering (M.S.)	—	20	18	2	20
Civil Engineering	484	2	370	116	486
Computer Engineering	224	—	193	31	224
Computer Science	422	59	376	105	481
Electrical Engineering	376	—	325	51	376
Electronic and Electrical Engineering	—	26	25	1	26
Electronic Engineering	376	2	352	26	378
Electronic Engineering Technology	23	—	21	2	23

(College of Engineering continued on next page)

Enrollment in Programs by College and Major, Fall 1993 (continued)

Colleges and Major Curricula	Undergrad	Grad.	Men	Women	Total
College of Engineering, continued					
Engineering (M.S.)	—	28	22	6	28
Engineering Management (M.B.A./M.S.)	—	23	17	6	23
Engineering Science	63	—	52	11	63
Engineering Technology	81	—	76	5	81
Environmental Engineering	276	1	171	106	277
Industrial Engineering	250	1	158	93	251
Materials Engineering	143	2	120	25	145
Mechanical Engineering	<u>745</u>	<u>6</u>	<u>654</u>	<u>97</u>	<u>751</u>
Totals	3,735	194	3,192	737	3,929
College of Liberal Arts					
Applied Art and Design	193	2	106	89	195
Child and Family Development	1	—	—	1	1
Counseling (M.S.)	—	3	1	2	3
English	244	70	109	205	314
Graphic Communication	251	4	121	134	255
History	154	1	94	61	155
Human Development	415	1	79	337	416
Journalism	156	—	53	103	156
Liberal Studies	314	—	51	263	314
Music	42	2	25	19	44
Philosophy	21	1	13	9	22
Political Science	215	1	123	93	216
Psychology (M.S.)	—	59	13	46	59
Social Sciences	253	1	77	177	254
Speech Communication	<u>130</u>	<u>—</u>	<u>38</u>	<u>92</u>	<u>130</u>
Totals	2,389	145	903	1,631	2,534
College of Science and Mathematics					
Biochemistry	218	2	112	108	220
Biological Sciences	434	20	207	247	454
Chemistry	62	—	34	28	62
Ecology and Systematic Biology	152	—	77	75	152
Mathematics	167	8	82	93	175
Microbiology	46	—	22	24	46
Physical Education	269	37	141	165	306
Physical Science	15	—	10	5	15
Physics	69	—	59	10	69
Statistics	<u>23</u>	<u>1</u>	<u>17</u>	<u>7</u>	<u>24</u>
Totals	1,455	68	761	762	1,523
University Center for Teacher Education					
Education (M.A.)	<u>—</u>	<u>438</u>	<u>111</u>	<u>327</u>	<u>438</u>
Campus Totals	14,239	1,104	8,843	6,500	3,523

ACCREDITATION

The university is fully accredited by the Western Association of Schools and Colleges. The Commission for Teacher Credentialing has authorized the university to recommend for a number of teaching credentials as described in the catalog section on "Teacher Preparation Programs." In addition, some degree programs are accredited by discipline-related accrediting agencies.

- Architecture (undergraduate) – National Architectural Accrediting Board
 - Business Administration (undergraduate and graduate) – American Assembly of Collegiate Schools of Business
 - City and Regional Planning (undergraduate and graduate) – Planning Accreditation Board of the American Institute of Certified Planners
 - Computer Science (undergraduate) – Computing Sciences Accreditation Board, Computer Science Accreditation Commission
 - Construction Management – American Council for Construction Education
 - Engineering (undergraduate: Aeronautical Engineering, Agricultural Engineering, Architectural Engineering, Civil Engineering, Electrical Engineering, Environmental Engineering, Industrial Engineering, Materials Engineering, and Mechanical Engineering) – Accreditation Board for Engineering and Technology, Engineering Accreditation Commission
 - Industrial Technology – National Association of Industrial Technology
 - Landscape Architecture – American Society of Landscape Architects
 - Nutritional Science – American Dietetics Association
 - Recreation Administration – National Recreation and Parks Association/American Association of Leisure and Recreation
-

POLICIES ON THE RIGHTS OF INDIVIDUALS

NONDISCRIMINATION POLICY

Sex

The California State University is committed to providing equal opportunities to men and women CSU students in all campus programs, including intercollegiate athletics.

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 Polytechnic State University, San Luis Obispo. Such programs and activities include admission of students and employment. Inquiries concerning the application of Title IX to programs and activities of California Polytechnic State University, San Luis Obispo may be referred to Carl Wallace, Director, Judicial Affairs, Office of Student Affairs, the campus officer assigned the administrative responsibility of reviewing such matters or to the Regional Director of the Office for Civil Rights, Region 9, 50 U.N. Plaza, Room 239, San Francisco, California 94102.

Persons with Disabilities

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 and the Americans with Disabilities Act of 1990 prohibit such discrimination. Anna J. McDonald, Affirmative Action Director, has been designated to coordinate the efforts of California Polytechnic State University, San Luis Obispo to comply with the Act in its implementing regulations. Inquiries concerning compliance may be addressed to her. Where student discrimination occurs, referral may be made to either Disabled Student Services, Office of Student Affairs, or Affirmative Action Office.

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. Referral may be made to the Office of Student Affairs and to the Affirmative Action Office.

Age, Marital Status, Religion, or Sexual Orientation

The California State University does not discriminate on the basis of age, marital status, religion, or sexual orientation. Referral may be made to the Office of Student Affairs and to the Affirmative Action Office.

SEXUAL HARASSMENT POLICY

What is Sexual Harassment?

Sexual harassment takes many different forms. In the university environment, repeated, unwanted verbal or physical sexual advances or the imposition of sexual attention are the types of sexual harassment that occur most often. If someone makes sexually explicit or sexually derogatory statements which affect you negatively, this also may constitute sexual harassment.

Sexual Harassment Distorts One's Self-Image

Sexual harassment can include, but is not limited to the following:

- Use of derogatory sexual remarks*
- Unwelcome personal attention or touching*
- Sexist jokes about your clothing or body*
- Comments about sexual activities*
- Requests for sex in exchange for grades, letters of recommendation, or employment opportunities*
- Threatening demands for sexual favors*

If Sexual Harassment Happens to You . . . Take Action!

There is something you can do about sexual harassment. First of all, TELL SOMEONE.

Sexual harassment can only begin to be eliminated when we talk with someone about our experiences. If we remain silent, sexual harassment will continue to be perceived as a personal problem rather than as a social problem. Silence often keeps us feeling guilty rather than violated.

Sexual harassment is not always a sexually motivated act. Typically it represents an assertion of power expressed in a sexual manner. Individuals

experiencing sexual harassment are aware of the power the harasser wields. They perceive a threat, either implicit or explicit, and conclude that they have to "put up" with this type of behavior or suffer the consequences.

Sexual harassment continues to be a serious social problem. Both men and women (usually women) are harassed by persons of the same or opposite sex. Surveys show that a majority of women today, at one time or another, have been sexually harassed. Research also shows that sexual harassment, when ignored, will often continue or increase.

Either tell the harasser that the advances are unwanted and you want them to stop, or write a letter. Let the harasser know that you view the behavior as sexual harassment. Say that you will report these actions if they continue. Keep a record if the harasser continues. Keep track of dates, times, places and statements. If you can, get a witness to hear you say "No." This information can be helpful when filing a complaint.

A Sexual Harassment Advisor can assist you with informal resolutions to sexual harassment or with filing a formal complaint. Advisors receive informal complaints, help complainants evaluate informal complaints, provide campus procedures and may help attempt informal resolution. The role of the Advisor can be one of mediation between parties. Go to the Vice President for Student Affairs if you are a student, or to Affirmative Action or Human Resources if you are an employee. If you decide to file a formal complaint, a Sexual Harassment Complaint Facilitator can assist you in following the procedures in Cal Poly's Sexual Harassment Policy (AB 93-1).

PROCEDURES FOR CAL POLY

Copies of the policy are available from an advisor or the Affirmative Action Office. The following is a brief outline of the procedures:

Informal Procedures

- * The Complainant directly, or through an Advisor, notifies harasser to stop offensive behavior, **or**
- * The Complainant may attempt to resolve complaint with the respondent's department head/chair, **or**
- * The *Student* Complainant may bring complaint directly to the Office of the Vice President for Student Affairs (Adm. 209), 756-1521.
- * The *Employee* Complainant should contact the Affirmative Action Office (Adm. 401), 756-2062.

Formal Procedures

Students file written charges with the Vice President for Student Affairs (Adm. 209), within 120 days of the alleged date of harassment.

Employees file with the director of Affirmative Action (Adm. 401) within 42 days after the event unless their union contract specifies a different deadline and different complaint procedures. The respondent has 10 days to respond to charges.

Applicants for employment file written charges with the director of Affirmative Action (Adm. 401).

Sexual harassment investigators endeavor to complete review within 35 days and send preliminary report of findings to the complainant and respondent, who have 10 days to provide any additional information.

Sexual harassment investigators forward a final report with a recommended remedy to the President's designee with copies to the complainant and respondent.

Within 20 days the President's designee makes a decision regarding disposition of complaint. Legal constraints limit the University from disclosing confidential personnel decisions.

GENDER HARASSMENT

Sex discrimination in the form of gender harassment consists primarily of repeated comments, jokes, and innuendoes directed at persons because of their gender or sexual orientation. This behavior typically is not aimed at eliciting sexual cooperation, but, like racial harassment, it contaminates the learning and work environment and has no place at Cal Poly. Examples of gender harassment include the following:

Disparaging women's intellectual abilities and potential;

Using sexist statements in classroom discussions;

Disparaging the life styles or behaviors of gays or lesbians.

These behaviors in isolation do not constitute sexual harassment as defined in AB 93-1. They are prohibited by federal, state, CSU and Cal Poly policies on discrimination.

STATEMENT ON RACISM AND DISCRIMINATION

Cal Poly will not tolerate acts of racism or discrimination of any type. The University is committed to being a community enriched by individual differences, in which diversity is valued and respected and in which all members live and work free from harassment, abuse, mockery, and discrimination.

STATEMENT ON ACADEMIC FREEDOM

Cal Poly recognizes and supports the principle of academic freedom, by which each faculty member has the right to teach, to conduct research, and to publish material relevant to that faculty member's discipline, even when such material is controversial. The University also guarantees to its faculty the same rights shared by all citizens which include: the right to free expression, the right to assemble, and the right to criticize and seek revision of the institution's regulations.

At the same time, the faculty should recognize an equally binding obligation to perform their academic duties responsibly and to comply with the internal regulations of the University. Each faculty member is expected to recognize the right of free expression of other members of the university community; intolerance and personal abuse are unacceptable. Faculty shall not claim to be representing the university unless authorized to do so.

CAMPUS STUDENT RELATIONS AND JUDICIAL AFFAIRS

A university is a place where you can develop intellectually, gain perspective on life and expand your sense of aesthetics and beauty. You should be encouraged to think logically, judge critically and communicate clearly.

To accomplish this, it is important to have candid discussion, intellectual honesty, openness to differing opinions and respect and tolerance for the rights of all individuals and groups. As a student at Cal Poly, you can expect a learning environment free from bias, discrimination, prejudice and harassment. Likewise, as a member of this academic community, it is your responsibility to afford those same rights and privileges to others.

In our society most institutions have some mechanisms to ensure and guarantee individual and group rights. Along with these rights comes corresponding responsibilities. On the Cal Poly campus the office of

Student Affairs is a place where individual and university rights and responsibilities are defined, discussed, and enforced. Areas such as academic rights and responsibilities, freedom of association, publication and creative expression, community relations—on and off campus, assembly and advocacy, sexual harassment, ethnic discrimination, disability, sexual orientation, sexual assault, privacy and records, academic dishonesty, fairness board, student discipline and other administrative procedures can be addressed in the Office of Campus Student Relations and Judicial Affairs.

CHEATING AND PLAGIARISM

Cal Poly will not tolerate academic cheating or plagiarism in any form.

Learning to think and work independently is part of the educational process.

Cheating or plagiarism in any form is considered a serious violation of expected student behavior and may result in disciplinary action. All faculty and students are encouraged to review the formal policy on cheating and plagiarism (including definitions, sanctions, and appeal procedures) found in the Campus Administrative Manual, Section 684.

University policy can be summarized simply:

As a student, you are responsible for your own work and you are responsible for your actions.

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—began admitting students in fall 1990.

Responsibility for The California State University is vested in the Board of Trustees, consisting of ex officio members, alumni and faculty representatives, and members 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 of 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 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 in California.

In fall 1993, the system enrolled approximately 326,000 students, taught by more than 16,000 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 20 campuses since 1960.

TRUSTEES OF THE CALIFORNIA STATE UNIVERSITY

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State Capitol, Sacramento 95814
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Speaker of the Assembly
State Capitol, Sacramento 95814
To be Appointed
State Superintendent of Public Instruction
721 Capitol Mall, Sacramento 95814
Dr. Barry Munitz
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400 Golden Shore, Long Beach 90802-4275

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

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Correspondence with Trustees should be sent:

c/o Trustees Secretariat, The California State University
400 Golden Shore, Suite 214, Long Beach, CA 90802-4275

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 The California State University
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 Long Beach, California 90802-4275
 (310) 985-2500

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CAMPUSES—THE CALIFORNIA STATE UNIVERSITY

California State University, Bakersfield

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

California State University, Chico

Dr. Manuel A. Esteban, President
 1st and Normal Streets, Chico, CA 95929
 (916) 898-6116

California State University, Dominguez Hills

Dr. Robert C. Detweiler, President
 1000 East Victoria Street, Carson, CA 90747
 (310) 516-3300

California State University, Fresno

Dr. John D. Welty, President
 5241 North Maple Avenue, Fresno, CA 93740
 (209) 278-4240

California State University, Fullerton

Dr. Milton A. Gordon, President
 Fullerton, CA 92634-9480
 (714) 773-2011

California State University, Hayward

Dr. Norma S. Rees, President
 Hayward, CA 94542
 (510) 881-3000

Humboldt State University

Dr. Alistair W. McCrone, President
 Arcata, CA 95521
 (707) 826-3011

California State University, Long Beach

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 1250 Bellflower Boulevard, Long Beach, CA 90840
 (310) 985-4111

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 5151 State University Drive, Los Angeles, CA 90032
 (213) 343-3000

California State University, Northridge

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 18111 Nordhoff Street, Northridge, CA 91330
 (818) 885-1200

California State Polytechnic University, Pomona

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 3801 West Temple Avenue, Pomona, CA 91768
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California State University, Sacramento

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 6000 J Street, Sacramento, CA 95819
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 5500 University Parkway, San Bernardino, CA 92407
 (909) 880-5000

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 5300 Campanile Drive, San Diego, CA 92182
 (619) 594-5000

Imperial Valley Campus

720 Heber Avenue, Calexico, CA 92231
 (619) 357-3721

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Dr. Robert A. Corrigan, President
 1600 Holloway Avenue, San Francisco, CA 94132
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 One Washington Square, San Jose, CA 95192
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California Polytechnic State University, San Luis Obispo

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 San Luis Obispo, CA 93407
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California State University, San Marcos

Dr. Bill W. Stacy, President
 San Marcos, CA 92069-0001
 (619) 752-4000

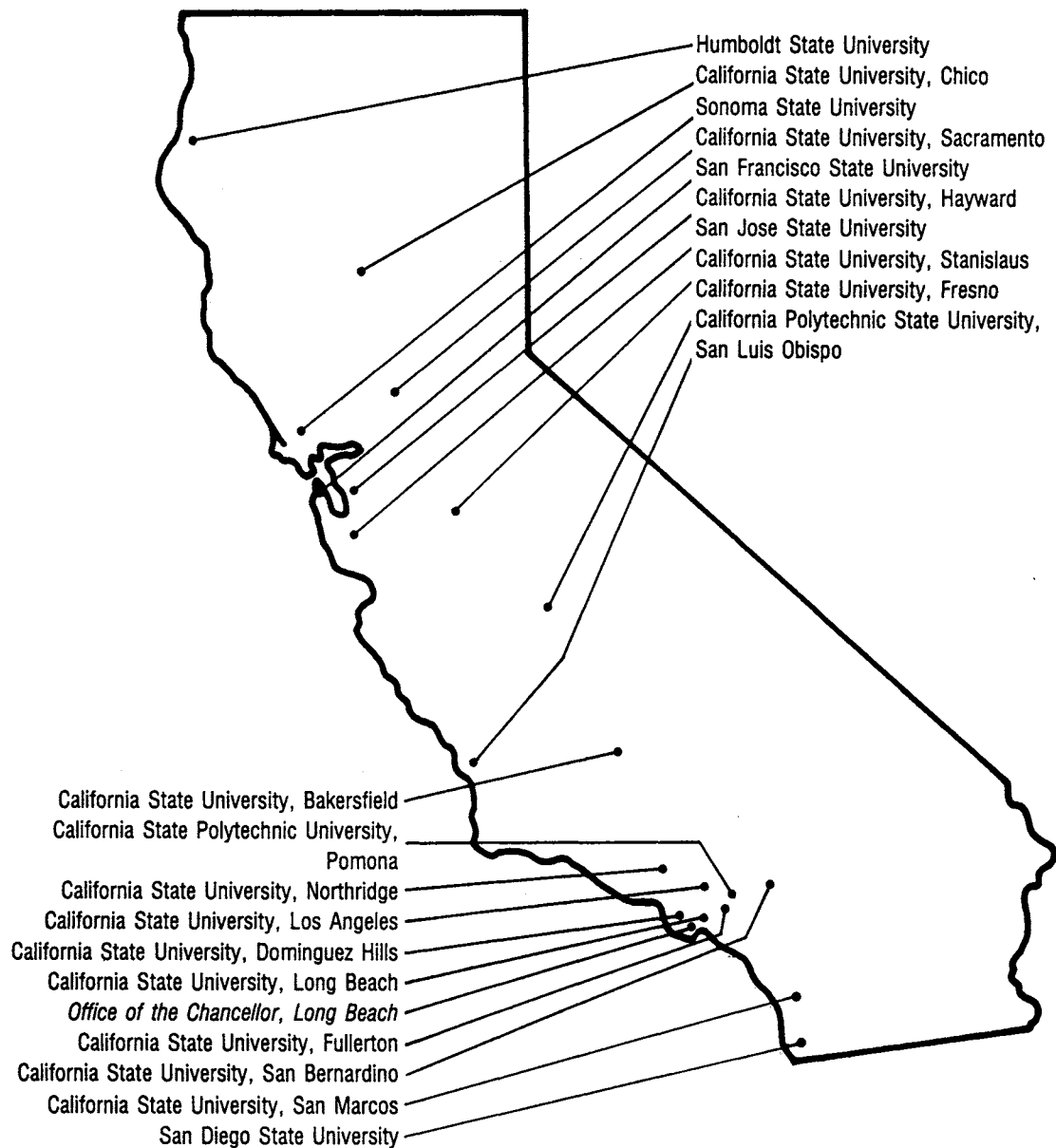
Sonoma State University

Dr. Ruben Armija, President
 1801 East Cotati Avenue, Rohnert Park, CA 94928
 (707) 664-2880

California State University, Stanislaus

Dr. Lee R. Kerschner, Interim President
 801 West Monte Vista Avenue, Turlock, CA 95380
 (209) 667-3122

THE CALIFORNIA STATE UNIVERSITY



CSU



ROBERT E. KENNEDY LIBRARY

The building features an interior courtyard design, open stack accessibility, and individual study stations. The Library collection contains over two million bibliographic items: 750,000-volume book collection, periodicals, art prints, nearly 3,000,000 microforms, senior projects, government documents, maps, audio visual materials, and various special collections. *Photo by Doug Allen.*

**SPECIAL
PROGRAMS
and
RESOURCES**

SPECIAL PROGRAMS AND RESOURCES

ALUMNI ASSOCIATION

Alumni Relations, Alumni House, 805 756-2586

Cal Poly's Alumni Association is the most important organization linking the university and the 150,000 students who have attended Cal Poly. To keep in touch with former students, the Alumni Association coordinates a variety of alumni functions both educational and social, on and off campus, throughout CA and across the nation.

The Alumni Association is governed by a president, a president elect, a secretary-treasurer, and a board of directors; the Office of Alumni Relations coordinates the activities of the association. The association has more than 30 active alumni chapters including chapters in Alaska, the District of Columbia, Hawaii, Chicago, Colorado, New England/Mid-Atlantic Region, Portland, Reno, and Seattle. These chapters offer social and educational events for Cal Poly alumni and create a rallying point for alumni activities.

Members of the Alumni Association enjoy opportunities to participate in group travel, insurance plans and many other unique alumni-sponsored programs such as Homecoming.

The Cal Poly Alumni Association has a keen interest in student activities, hosting special events for students and parents, and sponsoring special student groups, such as the Student Alumni Council, which is known as Poly Reps.

COMPUTING AT CAL POLY

Computer Science Bldg. (14), 805 756-5506

Information technology plays an increasingly important role on campus, both in the academic programs and administrative services. Computer literacy is a General Education and Breadth requirement at Cal Poly; thus students frequently encounter computers in their classes. Computer technology is used in all academic disciplines.

Professional techniques and systems are simulated in the classroom environment. Research grants, special projects, and equipment donations from industry supplement existing campus computing resources. Four departments serve the campus community:

Academic Computing Services (ACS) consults with and supports faculty; and plans, coordinates, and manages campuswide academic computing resources. The CSU Computer-Aided Productivity Center, located

at Cal Poly, is devoted to the support of academic programs and instruction, including schools of business under the auspices of the CSU/IBM Academic Mainframe Specialty Center (AMSPEC).

Administrative Systems consults with and trains administrative staff; designs, analyzes and manages the central administrative data systems; and facilitates daily production of class lists, grades, and other reports.

Communications Services implements, coordinates, and manages all campuswide communication resources including telephones, broadband and baseband data, television, satellite, radio, paging, voice amplification, visual presentation, and alarm/life safety support systems. Audio-Visual Services is a part of Communications Services.

Computing Services ensures continuous operation of the campuswide computing systems; orders routine and emergency maintenance; and manages machine performance and environmental conditions.

Resources and Facilities

Current hardware systems include an IBM ES/9000-732 mainframe computer, IBM RS/6000 AIX cluster, Sun network, various departmental minicomputers, and advanced workstations. While some of the computers run specialized academic applications, many are available for use by all Cal Poly students. Cal Poly's mainframe provides access to electronic mail, a CSU systemwide network, Internet, and other national/global networks and information services.

Cal Poly has several microcomputer and terminal lab facilities for classroom instruction, independent study, and research and development. Apple Macintosh, Hewlett Packard, IBM and other systems are available to students.

An integrated database on the IBM mainframe facilitates administrative processes such as admissions and records, financial aid, class scheduling, fiscal operations and human resource management. These resources are linked through a campuswide data communications network.

The Faculty Multimedia Development Center supports curriculum development, delivery of instruction, and course materials electronically to both on- and off-campus sites. Other innovations, such as electronic applications and kiosks, are being implemented to

facilitate student access to university services and information. Use of these facilities is expected to expand with the increasing availability of interactive technologies and "information highways".

CONFERENCES AND WORKSHOPS

Sequoia (108), 805 756-7600

The Conference Coordinating Center coordinates facilities and services for conferences, professional meetings, workshops and other special programs related to the university's educational objectives. The staff provides assistance with planning, budgeting, advertising, registration, meeting rooms, housing, food services, transportation, and specialized services. Extended Education may provide publicity and instructional support, and coordinate the granting of academic or professional credit.

CONTINUING EDUCATION IN AGRICULTURE

Agricultural Education, Bldg. 10, Room 244, 805 756-2803

Cal Poly plays an active role in the professional development and continuing education of high school and community college teachers of agriculture. Instructional staff and facilities are provided for workshops and training programs cooperatively sponsored by the university and the State of California.

The campus offers an annual summer skills program. The content varies, depending upon the needs and desires of the teachers as these are expressed through the California Agricultural Teachers' Association. Cal Poly faculty members provide up-to-date training in the technical phases of agriculture and also contribute to the professional improvement of teachers by offering instruction in teaching methods.

EXTENDED EDUCATION

Jespersen Hall (116), Room 101, 805 756-2053.

Extended education programs provide a variety of services to residents of San Luis Obispo, Santa Barbara, and southern Monterey Counties. These programs are self-supporting through student enrollment fees or agency funding. An up-to-date catalog, *Excel*, describes the programs and course schedule and is available at no cost. You may also request to be placed on the mailing list.

Extension Programs

The extension program provides a way to earn college credit, acquire skills, enhance career opportunities, and/or broaden awareness of today's world. Extension courses are offered on campus and at various locations throughout the tri-counties.

Many extension courses are seminars or workshops that offer opportunities for professional development or personal growth, but do not provide academic credit. These courses are attended by working people and community members of all ages. Some of these courses comprise programs that lead to a certificate of completion. Extension programs are scheduled throughout the year, including summer programs for youth and senior adults. A special program for seniors, Elderhostel, is offered during Winter Quarter.

Extended Education provides support for the educational aspects of conferences and special programs, such as arrangements for academic or professional credit, recruiting and compensation of seminar leaders and instructors, and publicity through extension media.

Enrollment in extension programs does not imply formal admission to the university. The maximum extension credit which may be accepted toward the bachelor's degree is 36 quarter units. No more than 13 quarter units may be counted toward the master's degree.

Concurrent Enrollment

Extension students may also take regular on-campus courses on a space-available basis through the concurrent enrollment program. *Extension fees and unit limitations apply to concurrent enrollment students.* Petitions and application forms may be obtained two weeks prior to the beginning of each quarter. This enrollment process is not available to regular matriculating students.

THE FOUNDATION

Foundation Administration Bldg. (15), 805 756-1131

The Cal Poly Foundation is a public benefit, nonprofit corporation created to support the educational mission of the university. The major objectives of the Foundation are:

- To provide the fiscal means and management procedures that enable the university to carry on activities providing those instructional and service aids not normally furnished by the state.
- To provide effective operation of key support services which would not otherwise be available due to legal, purchasing, and other fiscal restrictions.
- To provide fiscal procedures and management systems that foster effective coordination of the auxiliary activities with the university in accordance with sound business practices.

Important services provided to the university community include El Corral Bookstore, Visual

Education Productions, and Campus Dining. In addition, the Foundation provides the basic financial, management, and business support services for University Graphics System; sponsored research, grant, and workshop projects; and serves as the official donee for gifts designated for the university and its various educational programs.

The Foundation aids students financially by sponsoring student enterprise projects; offering opportunities for students to combine learning and earning; and loaning operating capital for faculty-supervised and educationally significant projects.

A Board of Directors oversees the operation of the Foundation which is administered by a management staff. Foundation activities must be requested and approved by the university. Each year the operations are subject to independent financial and compliance audits.

The Foundation Board holds regular meetings which are open to the public and are regularly attended by representatives of the university's faculty, staff, and student association officials.

HEALTH SCIENCES—PREPROFESSIONAL PREPARATION

College of Science and Mathematics Advising Center, 805 756-2615

Health Professions Guidance and Evaluation Committee, 805 756-2209

Minority Access to Health Careers, 805 756-2840

Choosing a Major

There is no "best" major to prepare students for professional school, as long as the prerequisite courses for the chosen profession are completed. The major should be chosen on the basis of interest and as preparation for an alternate career. Typically, Cal Poly students major in Biological Sciences or Biochemistry if interested in dental or medical school; major in Animal Science, Biological Sciences, or Dairy Science if interested in veterinary medicine; and major in Biochemistry, Biological Sciences or Microbiology if interested in medical technology. Students interested in professional schools which do not generally require a baccalaureate degree for entrance (chiropractic, nursing, optometry, or pharmacy) choose from a wide variety of majors. Specific requirements vary for each professional schools, so students should contact the schools directly.

Preprofessional Advising

The Health Professions Guidance and Evaluation Committee assists students, regardless of their major, in all phases of applying to professional schools.

Committee members assist students to identify the appropriate health profession, to select preparatory courses, and to develop the proper strategy for entrance. They also critique personal statements connected with applications, conduct interviews in order to write letters of evaluation, and help prepare students for interviews at professional schools. If appropriate, alternate careers are suggested.

The Committee consists of approximately 20 faculty from the departments of Animal Sciences, Biological Sciences, Chemistry, English, Mathematics, Physical Education and Kinesiology, Physics, Psychology and Human Development, and Speech, and staff members from Psychological Services and the Minority Access to Health Careers Office. Students who belong to groups traditionally underrepresented in the health professions (especially ethnic minorities who are Afro-American, Hispanic or Native American) are encouraged to seek assistance from the Minority Access to Health Careers (MAHC) Office.

Chiropractic

Students only need to complete two years of preprofessional work prior to admission to chiropractic school. All accredited programs require identical course work. For more information consult the latest edition of "The Chiropractic College Directory", KM Enterprises, P.O. Box 25978, Los Angeles, CA 90025. The following Cal Poly courses meet the minimum preparation:

BIO 151, 153; 152 or BACT 221
CHEM 127, 128, 129, 316, 317
ENGL 114, 125, 215/218
PHYS 121, 122, 123
PSY 201/202, 304
ZOO 237, 331, 332
7-8 courses in Social Science or Humanities

Dentistry

Students complete three to four years of preprofessional course work prior to admission to dental school. For exact prerequisites check individual catalogs or the latest edition of "Admissions Requirements of U.S. and Canadian Dental Schools" published by the American Association of Dental Schools (1625 Massachusetts Avenue, N.W., Washington, D.C. 20036). The Dental Aptitude Test (DAT) should be taken at least one year prior to the projected date of admission. Students usually apply to 8 to 12 schools. The following Cal Poly courses meet the minimum preparation:

BIO 151, 153; 152 and/or BACT 221
CHEM 127, 128, 129, 316, 317, 318
ENGL 114, 125, 215/218
PHYS 121, 122, 123

Medical Technology (Clinical Laboratory Technology)

Students need to complete a baccalaureate degree, which includes the specified coursework in order to qualify for the required twelve-month medical technology traineeship. The

microbiology major offers excellent preparation for a traineeship and faculty serve as knowledgeable advisers. The following Cal Poly courses meet the minimum preparation:

BACT 221, 222, 423
 BIO 151, 153
 CHEM 127, 128, 129, 326, 328, 331
 PHYS 121, 122, 123
 ZOO 426, 428

Medicine (Allopathic, Osteopathic, Podiatric)

Students generally complete three to four years of preprofessional course work prior to admission to medical school. For exact prerequisites, check individual catalogs, or for allopathic medicine, the latest edition of the "Medical School Admissions Requirements, U.S.A. and Canada" published by the Association of American Medical Colleges (One Dupont Circle, N.W., Washington, D.C. 20036), or for osteopathic medicine, the latest edition of "The Education of the Osteopathic Physician," published by the American Association of Colleges of Osteopathic Medicine (6110 Executive Blvd., Suite 405, Rockville, MD 20852). There is no similar general publication for podiatric medical colleges. For allopathic and osteopathic schools the Medical College Admissions Test (MCAT) must be taken at least one year prior to the projected date of admission. However, for some podiatric schools, the MCAT can be taken as late as the Spring of the year of projected admission. Students usually apply to 8–30 allopathic schools, or 3–6 osteopathic schools or 2–6 podiatric schools. The following Cal Poly courses meet the minimum preparation for most schools:

BIO 151, 153; 152 and/or BACT 221
 CHEM 127, 128, 129, 316, 317, 318
 ENGL 114, 125, 215/218
 MATH 141
 PHYS 121, 122, 123

Nursing

Two years are usually required to complete prerequisites prior to transferring to community college, hospital diploma, or baccalaureate nursing programs. Prerequisites vary greatly from program to program and students should consult individual catalogs or the latest edition of "Baccalaureate Education in Nursing: Key to a Professional Career in Nursing" published by the National League for Nursing (10 Columbus Circle, New York, N.Y. 10019). A professional exam may be required for entrance. The following Cal Poly courses meet the minimum preparation:

ANT 201
 BACT 221
 BIO 151, 153
 CHEM 127, 128, 326, 328
 ENGL 114, 125
 FSN 210
 PSY 201/202, 307
 SOC 105
 ZOO 237, 238, 239

Optometry

Students generally complete 3–4 years of preprofessional coursework prior to acceptance to optometry school. The Optometry Admissions Test (OAT) is required for entrance. For exact prerequisites, check individual catalogs or the latest edition of "Admissions to Schools and Colleges of Optometry" published by the American Optometric Association, 243 N. Lindbergh Blvd., St. Louis, MO 63141. The following Cal Poly courses meet the minimum preparation:

BACT 221
 BIO 151, 152, 153
 CHEM 127, 128, 316, 317, 318 or 328
 ENGL 114, 215/218
 MATH 141, 142
 PHYS 121, 122, 123
 PSY 201/202
 STAT 211, 212
 ZOO 237, 238, 239

Pharmacy

Students generally complete two to three years of preprofessional course work prior to admission to pharmacy school. The Pharmacy College Admissions Test (PCAT) may be required. For exact prerequisites, check individual catalogs or the latest edition of "Pharmacy School Admission Requirements" published by the American Association of Colleges of Pharmacy (1426 Prince St., Alexandria, VA 22314-2841). Students usually apply to 2 to 3 schools. The following Cal Poly courses meet the minimum preparation:

BACT 221
 BIO 151, 152, 153
 CHEM 127, 128, 129, 316, 317, 318
 ECON 211
 ENGL 114, 125, 215/218
 MATH 120, 141, 142
 PHYS 121, 123
 PSY 201/202, 301
 SPC 201/202

Physical Therapy

Currently professional training occurs at either the Certificate, Baccalaureate or Graduate level. For exact prerequisites, check individual catalogs or the latest edition of "Directory of Physical Therapy Education Programs" published by the American Physical Therapy Association (1111 N. Fairfax St., Alexandria, VA 22314-1488). Applicants are expected to have considerable experience in the field. Graduate programs require satisfactory scores on the Graduate Record Examination (GRE). The following Cal Poly courses meet the minimum preparation:

BACT 221
 BIO 151, 153
 CHEM 127, 128, 129
 CSC 110
 PE 302, 303, 402
 PHYS 121, 122, 123
 PSY 201/202, 301, 307
 STAT 211
 ZOO 237, 238, 239, 340

Physician Assistant

Physician Assistant (P.A.) programs generally require one to two years of undergraduate course work and one to two years of patient care experience. Each school has its own special requirements, thus students should consult individual catalogs or the latest edition of the "Physician Assistant Programs Directory" published by the Association of Physician Assistant Programs, 950 N. Washington St., Alexandria, VA 22314. The following Cal Poly courses meet the minimum preparation:

BACT 221
BIO 151, 153
CHEM 127, 128
ENGL 114
MATH 118
PHYS 121; 122 or 123
PSY 201/202, 307
SOC 105 or ANT 201
ZOO 237, 238, 239, 340

Veterinary Medicine

Students generally complete three to four years of preprofessional course work prior to admission to veterinary school. In the past, only the veterinary school at U.C. Davis accepted applicants from CA, but recently CA residents have been accepted to several out-of-state veterinary schools, both public and private. For exact prerequisites and residency requirements, check individual catalogs or the latest edition of "Veterinary Medical School Admission Requirements in the United States and Canada" published by Betz Publishing Company, Inc. (P.O. Box 34631, Bethesda, MD 20817). Generally, the veterinary colleges expect applicants to have at least two months of veterinarian supervised experience preferably with both large and small animals. A professional exam is usually required for entrance. The following Cal Poly courses meet the minimum preparation:

BACT 221
BIO 151, 152, 153, 303
CHEM 127, 128, 129, 316, 317, 318, 328/371
ENGL 114, 125, 215/218
PHYS 121, 122, 123
PSY 201/202
STAT 131 or 211
ZOO 405; 432, 433 or VS 438

RESEARCH AND PROJECT INVOLVEMENT

*Research and Graduate Programs, Bldg. 38,
Room 155, 805 756-1508*

Faculty actively seek grants and contracts for research and development activities. These sponsored projects enhance the educational program by bringing to the campus state-of-the-art equipment and financial support for undergraduate and graduate student research.

Students who wish to become involved in significant applied research and development activities on the

leading edge of their disciplines are encouraged to contact faculty members in their programs with ongoing projects to explore becoming part of the project team.

ROBERT E. KENNEDY LIBRARY

Building 35, 805 756-2598

The Robert E. Kennedy Library provides a variety of comfortable and attractive environments for study, research, and browsing. The building features an interior courtyard design, open stack accessibility, and individual study stations. The Library collection contains over two million bibliographic items. The 750,000-volume book collection is supplemented by periodicals, art prints, nearly 3,000,000 microforms, senior projects, government documents, maps, audio visual materials, and various special collections.

One of the major activities of the Library is library instruction. Besides individual instruction in the use of the library, librarians conduct library tours for groups and individuals and also give lectures to class groups at the request of instructors. The Library offers credit-bearing courses in the use of library materials to students during Fall, Winter, and Spring quarters.

The Reference Department contains extensive holdings of reference materials, indexes, and abstracts. Also included in the reference collections are telephone directories for all metropolitan areas and state capitals within the United States, industrial standards from the major professional and trade associations, catalogs from over 16,000 companies, college catalogs from all fifty states, and reports from all corporations listed on the American and New York Exchanges.

In addition to regular reference service, on-line computer search services are available for student and researcher needs. The Reference Department also assists users in accessing the several on-line services made available by the library such as UnCover, Lexis-Nexis, FirstSearch, Dow-Jones News, etc.

The Learning Resources and Curriculum Department contains a variety of collections: the library's audiovisual collection which consists of study prints, fine art prints, color slides, audio and video cassettes, video discs, and other non-print media; computer software; the children's book collection; standardized tests; elementary and secondary textbooks; curriculum materials. The department houses the Instructional Materials Display Center for textbooks used in California's public schools, and the Curriculum Microcomputer Center.

The Government Documents and Maps Department is a selective depository for United States documents and California State documents. It also contains cartographic material, the local government

collection, Agricultural Experiment Station and Extension Service publications, National Technical Information Services publications and United Nations documents. It is a full depository for U.S. nuclear power plant documents.

The Special Collections and University Archives Department contains many specialized research collections which because of their value or rarity must have added protection. The Julia Morgan (Hearst Castle architect) collection, the Fairs (world, state, and local) collection, and the Arthur G. Barton (architect of Dodger Stadium) collection are a few examples of the materials the Library has obtained in recent years. The University Archives houses records and other materials which document the history, development, and activities of the university from its beginning in 1903 to the present day.

Materials which are not available in the Library's collections can be requested from Interlibrary Loan and Document Delivery. These can be supplied from one of the twenty CSU libraries, the University of California library system, or from other cooperating libraries throughout the United States and the world.

SERVICES TO VOCATIONAL AGRICULTURE

*Agricultural Education, Bldg. 10, Room 244,
805 756-2803*

Cal Poly staff offer a variety of services to secondary school vocational agriculture departments. Staff visit the schools and discuss current agricultural topics with teachers and students; including computer applications to agriculture; writing for agricultural magazines; and using the Agricultural Education Computer Network. Other activities are judging of livestock, poultry, crops and other products at fairs; furnishing of breeding stock and hatching eggs to improve herds and flocks owned by Future Farmers; and preparing a variety of teaching aids. These services are provided through a cooperative arrangement with the State. Communications Media Production staff of the Vocational Education Productions Department produce and distribute agricultural educational materials through catalog sales to teachers nationwide.

STUDY ABROAD PROGRAMS

Building 38, Room 100, 805 756-1477

The CSU International Programs

Developing intercultural communication skills and international understanding among its students is a vital mission of The California State University (CSU). Since its inception in 1963, the CSU International Programs has contributed to this effort by providing qualified students an affordable opportunity to

continue their studies abroad for a full academic year. To date, over 10,000 CSU students have taken advantage of this unique study option.

International Programs participants earn resident academic credit at their CSU campuses while they pursue full-time study at a host university or special study center abroad. The International Programs serves the needs of students in over 100 designated academic majors. Affiliated with 35 recognized universities and institutions of higher education in 16 countries, the International Programs also offers a wide selection of study locales and learning environments.

Australia: The University of West Sydney

Brazil: Universidade de São Paulo

Canada: The universities of the Province of Quebec (13 institutions, including Université de Montréal, Concordia University, Université Laval, McGill University, Université du Québec system, Bishop's University, i.a.)

Denmark: Denmark's International Study Program (the international education affiliate of the University of Copenhagen)

France: Institut des Etudes Françaises pour Étudiants Étrangers, Université de Droit, D'Économie et des Sciences D'Aix-Marseille (Aix-en-Provence). Mission interuniversitaire de coordination des échanges franco-américains, Universités de Paris III, V, VI, VIII, X, XI, XII, XIII

Germany: Ruprecht-Karls-Universität (Heidelberg), Eberhard-Karls-Universität (Tübingen)

Israel: The Hebrew University of Jerusalem

Italy: CSU Study Center (Florence), Università degli Studi di Firenze, La Accademia di Belle Arti di Firenze

Japan: Waseda University (Tokyo)

Mexico: Universidad Iberoamericana (Mexico City)

New Zealand: Lincoln University (Christchurch), Massey University (Palmerston North)

Spain: Universidad Complutense de Madrid, Universidad de Granada

Sweden: Uppsala Universitet

Taiwan: National Chengchi University (Taipei)

United Kingdom: Bradford University, Bristol University, Kingston University, Sheffield University, University of Swansea

Zimbabwe: University of Zimbabwe (Harare)

The International Programs pays all tuition and administrative costs for participating California resident students to the same extent that such funds would be expended to support similar costs in California. Participants are responsible for all personal costs, such as transportation, room and board, living expenses, and home campus fees. Participants remain eligible to receive any form of financial aid (except work-study) for which they can individually qualify.

To qualify for admission to the International Programs, students must have upper division or graduate standing at a CSU campus by the time of departure. Students at the sophomore level may, however, participate in the intensive language acquisition programs in France, Germany, and Mexico. California Community Colleges transfer students are eligible to apply directly from their community college if they can meet this requirement. Students must also possess a current cumulative grade point average of 2.75 or 3.0, depending on the program for which they apply. Some programs also have language study and/or other coursework prerequisites.

Many Cal Poly departments support the concept of international education and encourage students to investigate opportunities for overseas study. Additional information and application materials may be obtained from the International Programs Office, or by writing to The CSU International Programs, 400 Golden Shore, Long Beach, CA 90802-4275.

Applications for the academic year overseas must be submitted by February 1. Three countries are exceptions, and have the following deadlines: Zimbabwe (November 15), and Australia and New Zealand (May 1).

Cal Poly International Programs

Australia Study—Agriculture, Ornamental Horticulture

The College of Agriculture offers students an opportunity to study ornamental horticulture at the Victorian College of Agriculture and Horticulture in Melbourne, Australia.

Australia Study—Architecture

The College of Architecture offers students an opportunity to study architecture or landscape architecture at Deakin University in Victoria, Australia.

Kenya Study

The Agricultural Business Department offers an opportunity to do an internship with Farming Systems Kenya, Ltd., a government agency in Nakuru, Kenya.

London Study Program

The university sponsors a London Study Program as a means to enrich the General Education and Breadth experience. Students and Cal Poly faculty live in London while they use the city's cultural resources as a laboratory for their study of the arts, humanities, and social sciences. Interested students are encouraged to discuss with their advisers a plan for meeting 12–15 units of GEB Area C and D requirements in a spring or summer quarter, preferably in the sophomore or junior year. Detailed information is included in brochures available at the University Union Information Desk.

Paris Study Program

The curricular focus is on French language and culture. Typically, instruction is offered in intermediate and advanced language, in a French culture course, and in a general education humanities course in art or literature. Students live with French families during their fall quarter in Paris. Detailed information is available from the Foreign Languages and Literatures Department.

TEACHER PREPARATION PROGRAMS

Dexter Building, Room 216, 805 756-2126

Cal Poly is authorized by the Commission on Teacher Credentialing to prepare candidates and recommend for the following credentials:

Multiple Subjects Instruction (as commonly practiced in California elementary schools)

Single Subject Instruction (as commonly practiced in California high schools and most junior high schools)

Adapted Physical Education Specialist

Agriculture Specialist

Administrative Services

Pupil Personnel Services

Reading/Language Arts Specialist

Special Education (Learning Handicapped Specialist and Severely Handicapped Specialist)

Multiple Subjects Credential Bilingual Emphasis (Spanish)

The Teacher Education Credential Program consists of the coursework and field experiences, including student teaching, required to obtain the Preliminary and Professional Clear Teaching Credentials. Guidelines for credentials are established by the State of California's Commission on Teacher Credentialing (CTC). *Admission to the university does not guarantee admission to the teacher education program.*

For more information regarding Teaching Credentials, please refer to the University Center for Teacher Education section of this catalog.

UNIVERSITY DEVELOPMENT

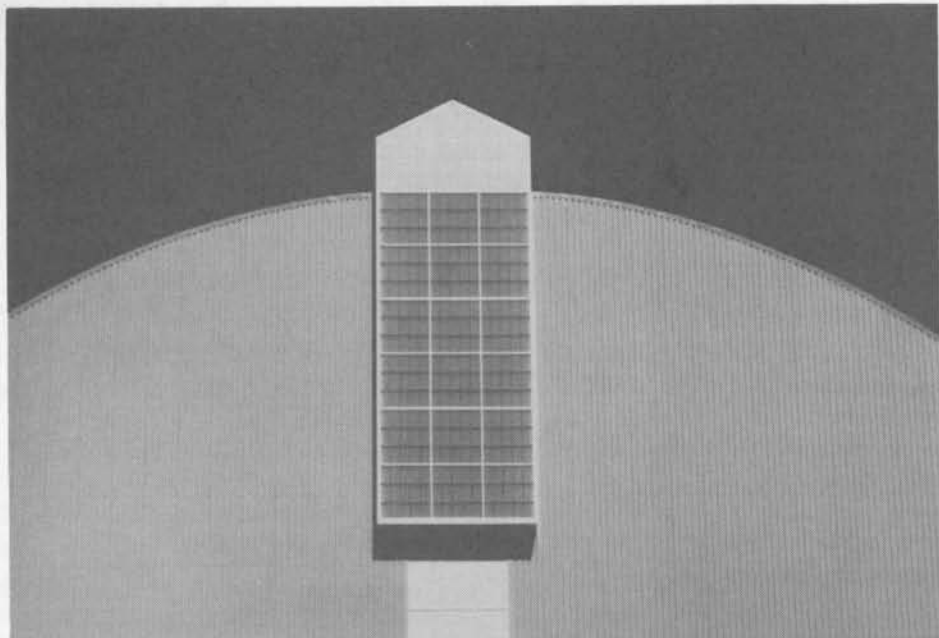
Administration Bldg. (01), Room 413, 805 756-1445

Gifts from many friends help the university maintain the excellence of its programs. Those friends include alumni, parents of students, faculty, staff, corporations, businesses, and foundations. Their contributions are of significant assistance. They enhance ongoing programs and provide funds for major capital improvements that cannot be financed through State resources.

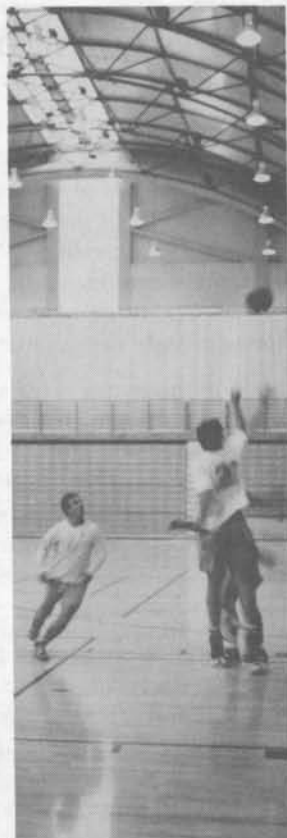
Contributions made through estate planning and deferred giving have been especially beneficial, both to the university and to the donors. They permit donors to make major gifts whose benefits to the university continue beyond the lifetime of the donor. Contributions to endowments are very beneficial in providing a stable source of resources for college and faculty support.

Several advisory groups provide valuable help in meeting university needs. Members of the President's Cabinet and the major donor groups are active in developing financial support from individuals and corporations. Advisory councils of the various colleges of the university provide additional assistance.

The athletic development program is designed to assist in funding athletic scholarships and other athletic program needs not included in the university's budget.



Photos by Doug Allen.



RECREATION CENTER

91,500 sq.ft. opened June '93
50-meter pool, double-level
gym, weight rooms, aerobics
studio, 9 racquetball courts,
concert seating for 3,500.

STUDENT ACTIVITIES and SERVICES



STUDENT ACTIVITIES and SERVICES

STUDENT ACTIVITIES

ASSOCIATED STUDENTS INC.

University Union (65), Room 212, 805 756-1281

Student involvement and governance at Cal Poly is coordinated through the Associated Students Incorporated (ASI), a non-profit student owned and operated corporation. The ASI collects quarterly fees which support a wide variety of campus activities including Recreational Sports, the Children's Center, and a multitude of cultural, educational and leisure activities.

A wide variety of leadership opportunities are open to interested students. These range from the elected College Council representatives that form the Board of Directors to appointed positions on the University Union Executive Committee, ASI Executive Staff and Finance Committee.

ASI Officers

The five chief officers of the corporation are the ASI President (C.E.O.), Chairman of the Board, Executive Vice President, Vice President for Finance, and Vice President for Operations. These officers are responsible for the daily operation of the ASI and are the recognized representatives of Cal Poly students. These positions are elected/appointed in Spring Quarter.

CAMPUS ORGANIZATIONS

There are over 350 clubs and organizations affording students the opportunity to become active in campus life. Clubs vary from academically related and professional organizations to hobby-interest clubs, honor societies, service clubs, sororities and fraternities, residential groups, ethnic and cultural groups, and spiritually-based groups.

CHILDREN'S CENTER

Children's Center (133), 805 756-1267

ASI Children's Center is a year-round day care program serving children of students, faculty, and staff who are from four months to six years of age. During the summer, the Center provides a program for school age children called *Poly trekkers*. Professional staff provide a program rich in activities to meet the social, emotional, cognitive, physical development and nutritional needs of young children. Cal Poly students are encouraged to work in the Center's classrooms, office, and kitchen, and often have hands-on experience through internships and special projects.

CRAFT CENTER

University Union (65), Room 111, 805 756-1266

Facilities and services available to students include: tool rentals, potter's wheels, kilns, darkroom, bike repair equipment, wood working power tools, and poster making supplies. Materials and craft classes are available at a minimal cost.

Craft classes include: bead making, stained glass, photo development, wood working, bike repair, and ceramics. An extensive library and resources on a variety of leisure crafts and skills is available.

ESCAPE ROUTE

University Union (65), Room 112, 805 756-1287

The Escape Route is the outdoor adventure center. Students may rent equipment such as tents, sleeping bags, and cross country skis, at the lowest prices in the county. An extensive collection of outdoor books, information on state and national parks, and topographical maps, are available as well as resources on snow camping, bicycle touring, back-packing, canoeing, rock climbing, and other activities. A large selection of videos is available. In addition, the Escape Route offers student-guided outdoor excursions which are sponsored by the nation's sixth oldest collegiate all volunteer outdoor group, the ASI Outings Committee.

FRATERNITIES AND SORORITIES

Student Life & Activities, University Union (65), Room 217, 805 756-2476

Twenty-three national fraternities (two local), nine national sororities (one local), and two local fraternities have chapters at Cal Poly.

Fraternities

Alpha Epsilon Pi	Omega Psi Phi
Alpha Gamma Rho	Phi Beta Sigma
Alpha Phi Alpha	Phi Delta Theta
Alpha Phi Omega	Phi Kappa Alpha
Beta Theta Pi	Phi Kappa Psi
Delta Chi	Phi Sigma Kappa
Delta Sigma Phi	Sigma Alpha Epsilon
Delta Tau	Sigma Chi
Delta Upsilon	Sigma Nu
Kappa Chi	Sigma Phi Epsilon
Kappa Sigma	Sigma Pi
Lambda Chi Alpha	Tau Kappa Epsilon
Nu Alpha Kappa	

Sororities

Alpha Chi Omega	Gamma Phi Beta
Alpha Kappa Alpha	Kappa Alpha Theta
Alpha Omicron Pi	Sigma Alpha
Alpha Phi	Sigma Kappa
Delta Sigma Theta	Zeta Tau Alpha

Most of the fraternities and sororities own or lease buildings near the Cal Poly campus. Some fraternities provide lodging and meals for their members and pledges; the sororities house approximately fifteen members each. Students interested in seeking affiliation with a sorority or fraternity should contact the Coordinator for Greek Affairs in the office of Student Life and Activities.

GALERIE

University Union (65), Room 221, 805-756-1182

The Galerie is a non-profit, educational arts facility which offers the first-hand experience of contemporary and historical works of art in a variety of media. The visual arts, as presented by the Galerie program, are considered an integral part of a university education. The Galerie employs students and provides direct involvement in the arts through cultural and social interaction, fine arts educational and interdisciplinary programs.

MULTICULTURAL CENTER

University Union (65), Room 202C, 805-756-1405

The Multicultural Center is a place for students to celebrate their heritage and connect with people from diverse cultural backgrounds. As a student center the MCC provides multi-cultural programs, a library of international newspapers and magazines, assistance to 20 ethnic clubs, and a place for students to drop in, read, and learn more about themselves and the world around them.

PROGRAM BOARD

University Union (65), Room 202A, 805 756-1112

Fun and Entertainment activities are some of the special services of the Associated Students Inc., handled through an organization known as the Program Board. Below is a listing of the Board's committees that make entertainment opportunities available at Cal Poly. All are run by students and welcome new members.

- *Concerts Committee* books nationally and internationally-known touring groups, ranging from rock to jazz, to country and alternative sounds.
- *Cultural Advisory Committee* strives to create an environment of sensitivity and awareness to cultural diversity.

- *Fine Arts Committee* brings the classics to the campus in the form of professional musical ensembles, theatre and dance productions, and art exhibitions.
- *Special Events Committee* sponsors a diverse program including concerts, comedy shows, acrobats and general entertainment.
- *Speakers Forum* arranges for speakers and panels to explore political, cultural, religious, technical and environmental issues.

RECREATIONAL SPORTS

Recreation Center (43), 805 756-1366

Recreational Sports provides opportunities for individuals within the university community to participate in a variety of fitness, leisure and recreational activities. Recreational Sports is an essential component of the educational experience at Cal Poly. The staff recognizes the value of developing the total person by attaining a balance of mind, body, and spirit. Based on this philosophy, the mission of the Recreational Sports program is to:

- Provide broad based programming to meet the ever-changing needs of a diverse university community.
- Provide a fun, safe, health, and service oriented environment.
- Embrace and celebrate the similarities and differences of all people.
- Provide leadership development opportunities for student staff and participants.
- Promote positive lifestyle choices.

Recreational Sports is an Associated Students, Inc. program and is funded 100% by student and user fees. The program is administered by students and it exists for students, faculty, staff and alumni. The student population provides the leadership, vision and commitment to ensure that the program is a vital, vibrant part of university life and individual development.

PROGRAM OVERVIEW

Informal Recreation provides non-structured opportunities to participate in a variety of activities such as table tennis, cardiovascular exercise, life-cycles, stair masters, and free weight and weight machines. Staff members are available to assist with any questions or concerns about the programs.

Intramural Sports provide a variety of structured team activities to help facilitate positive interaction between teams and individuals. A sample of the sports offered

are: volleyball, basketball, soccer, inntertube waterpolo, and ultimate Frisbee.

Sport Clubs are student administered intercollegiate competitions. Members of various teams compete against clubs from other universities, improve their skills through instruction, and develop leadership skills through the management of their organization. There are 13 Sport Clubs including: badminton, men's and women's crew, men's and women's lacrosse, rugby, fencing, and wheelmen.

Fitness and Instructional programs are designed to offer individuals an opportunity to acquire new skills, and participate in personal fitness programs in a relaxed and enjoyable setting. A few of the programs offered are aerobics, aqua aerobics, massage, and martial arts.

Special Events are scheduled each quarter. Twelve to fifteen events are offered each year, including tennis tournaments, fun runs, racquetball tournaments, and a triathlon.

RECREATION CENTER

The 91,500-squarefoot Center, which opened in June 1993, boasts a state-of-the-art exercise room; 50-meter pool; a multi-use, double-level gymnasium; nine racquetball courts; gymnastics, martial arts and weight rooms; an aerobics studio; concert seating for approximately 3,500; 3 1/2 outdoor basketball courts; and offices for Recreation Sports staff. The adjacent Physical Education Building provides 26 faculty offices and other administrative spaces.

ROSE FLOAT

University Union (65), Room 209, 805 756-1268

When the estimated 300-million viewers watch the Tournament of Roses Parade each year, they get a glimpse of the talent and ingenuity of Cal Poly students. Working cooperatively with students from Cal Poly, Pomona, members of the Rose Float Committee do everything from design to parade staging. The Cal Poly entry has won 36 awards.

STUDENTS SERVING IN THE COMMUNITY

Student Life & Activities, University Union (65), Room 217, 805 756-2476

Cal Poly strongly encourages students to develop a sense of social responsibility by being involved in community service activities as part of the university's educational and developmental experience. Students who contribute 120 hours or more of service while enrolled at Cal Poly are eligible for notations documenting service on their official university transcripts.

A significant number of students are working to help improve the quality of life in the community. Many combine service with their academic programs in a wide variety of ways through class projects, internships, senior projects, and special problems courses as well as through involvement in academic centers and institutes.

Through Student Community Services and other student-sponsored service activities, volunteers become special PALS to kids from single-parent homes, work with developmentally disabled people and assist with Special Olympics. They tutor children in grades K through 12 in many subject areas and help adults learn to read and write. They "adopt" senior citizens, help out in programs for people who are homeless, raise funds for local human service agencies and lend a hand in large and small emergencies.

Students obtain information about volunteer and academically-related community service opportunities available to individuals and to groups through the Community Service Center next door to the Office of Student Life and Activities located in University Union.

TRAVEL CENTER

University Union (65), Room 102, 805 544-9442

The Travel Center is a full service agency complete with student travel counselors and professional travel agents to serve the campus community. The staff can help make plane, train, or ship travel arrangements plus help complete passport applications, Eurail, Britrail, and Amtrak passes, American Youth Hostel Cards, and International ID cards.

THE UNIVERSITY UNION

Lobby, University Union (65), 805 756-1154 (Voice or TDD)

The Julian A. McPhee University Union is a place for students, faculty, staff, alumni and guests to meet, relax and exchange ideas. The University Union provides numerous services such as the Information Desk, Julian's Coffee and Ice Cream Shop, Backstage Pizza, Multicultural Center, Galerie, Travel Center, McPhee's Games Area, Craft Center, Second Edition Copy Center, and Escape Route. Facilities available include: Bishop's Lounge for television viewing, conference rooms, Chumash Auditorium, and the Student Life and Activities Office, ASI Student Executive Offices, and ASI Business Office.

WEEK OF WELCOME

WOW stands for Week of Welcome—Cal Poly's unique orientation program. The program is planned and operated by students for students, with a peer-helping method that creates a fun, comfortable atmosphere

during the orientation. Week of Welcome takes place before classes begin in September. The WOW experience is designed to assist new students with successful academic, social and emotional transition to university life.

WOMEN'S PROGRAMS AND SERVICES

*Student Life & Activities, University Union (65),
Room 217, 805 756-2476*

Programs and services support the personal and academic growth of women, encourage empowerment, and promote the understanding of women's issues on the Cal Poly campus. Students, faculty and staff work together to create activities, programs and services. Campuswide programs have included: Take Back the Night, Women's Week, International Women's Day, Women of Color Forum, Gender and the Law, Chicana/Latina Conference, and Civil Rights Awareness Week. These programs are planned and produced by cooperatively by many campus groups.

STUDENT SERVICES

CAREER SERVICES

*Student Services Bldg. (124), Room 114,
805 756-2501*

A centralized service is available to all students and alumni of the university. The Career Services staff and instructional departments work together in assisting students to obtain the most suitable employment consistent with their preparation and experience. To this end, a full complement of programs and services are available.

Career Counseling and Planning

Through individual appointments and group seminars, students are guided through the exploration and formation of personal career plans. Under the direction of department staff, students may take advantage of interest and aptitude inventories, utilize computerized career guidance systems, review current literature on career profiles, trends, and work environments, attend department-sponsored career fairs or employer/industry information sessions, and meet informally with recent graduates who are currently in the career being considered.

Students who are considering a change of major are particularly encouraged to utilize these career services so that they may become better informed about their future career potential.

Student Employment

On campus and off campus part-time and summer employment opportunities are available to all currently

enrolled students. Students who are taking a quarter off or alumni may also be eligible for services. All employment opportunities and workshop are available on a first-come, first-served basis throughout the year.

A special effort is made to place students in career related part-time and/or summer employment. Job information and listings from throughout California and the Western United States are available to students along with a limited number of on-campus interviews. Because of the developmental impact this service has on a student's future career direction, students are encouraged to participate as early in their college experience as possible.

Cooperative Education

Cooperative Education is designed to meet unique educational needs of students by providing practical work experience directly related to academic fields of study and career objectives. Students gain on-site work experience in business, industry and governmental agencies and have the opportunity to work with professionals in their fields of study. Students who participate in Co-op may earn academic credit, receive competitive wages, gain marketable skills, and develop self confidence. Generally, assignments are six months in duration.

Eligibility requirements vary among academic departments, but students need to have a minimum GPA of 2.0 and have completed their freshman year (or one quarter in residence for transfer students) to register and begin the Co-op job search process. Opportunities for students are primarily located in California and the Western States; students may choose to consider other parts of the United States or even abroad. Staff and faculty continually seek new contacts in order to provide appropriate employment for interested students.

It is a goal to enable all students to benefit from the Cooperative Education experience. Interested students are encouraged to stop by Career Services for further information.

Career Placement

All Cal Poly students should register with Career Services no later than the first quarter of their final year on campus. Through workshops and individual advisement, students are guided through the job search process which includes clarifying the career objective, how to identify, research and contact potential employers, preparation of the resume, and interview preparation.

Employer contacts may be generated through the on campus interview program, posted vacancy announcements, career and job fairs, as well as professional directories and publications geared

toward the hiring of new college graduates. Students are encouraged to take advantage of the Career Resource Center which contains a variety of career opportunity brochures, annual reports on the placement of graduates, a summary of job listings by major, current salary offer information, and occupational trend reports.

FOOD SERVICE

Foundation Campus Dining prepares nutritious and delicious meals for Cal Poly's 2,800 residence hall students and 6,000 other campus customers. With eleven food operations located throughout the campus, Campus Dining offers everything from snacks to full meals to campus-grown produce. Four dining facilities (the Lighthouse, VG Cafe, the Sandwich Plant and the Snack Bar) provide full meal service. Other facilities include Backstage Pizza, Julian's, Campus Store, Snak Stop, Staff Room, Cellar, and vending areas. Vista Grande Restaurant offers elegant, full table service meals. Campus Catering is available for special events.

The Campus Express Club

Membership in the Campus Express Club is open to all students, faculty and staff. The Campus Express Club is a declining balance account that works like a credit card in reverse. Members deposit money to their account and then use their campus I.D. card to make purchases at most Campus Dining locations. Membership has its privileges, including a 5% bonus for deposits of \$100 or more and special discounts offered at Campus Dining locations.

HEALTH SERVICES

Student Health Center (27), 805 756 1211 (Voice or TDD)

The mission of the Student Health Center is to support the physical well being of all students attending Cal Poly. The staff and facilities help minimize class time lost because of illness or injury. This support is provided through outpatient medical care and health education programs. These services are available to all students as part of the mandatory health fee and are described below.

Basic outpatient care is available Monday through Friday, year round, 8:00 a.m. to 4:30 p.m. and includes physician and nursing services, women's health care, laboratory and x-ray services. Pharmacy items are available at cost.

Health education programs are provided by staff professionals and students trained as peer health educators. Programs include nutrition counseling, sexuality, alcohol use/abuse, oral health, and lifestyle

wellness. Also available are self-help clinics on hayfever, colds, acne, and stress reduction.

Additional services are also available at a low cost and include pharmacy items (prescription and over-the-counter items), lab tests when specimens are sent off campus for processing, immunizations, and orthopedic supplies.

Major medical insurance coverage for off-campus services is strongly recommended since major medical/surgical problems cannot be treated on campus at the Health Center.

RESIDENTIAL LIFE AND EDUCATION

Housing Office (29) 805 756-1226

Living on campus can be a unique and rewarding experience. For nearly two-thirds of all entering first year students it is the first experience in a new environment. Students participate in a variety of social interactions and share the same community with a diverse groups of individuals. It is this living environment, where diversity and culturalism are discussed, that provides residents with opportunities to explore their ideas and values in a safe learning community.

Residents are provided with an environment which educates, challenges, and supports their personal and academic development. Learning in the classroom is extended into the residence halls through formal programming, recreational activities, and the Living/Learning Programs. All activities are coordinated by the residents and the staff. Most students make lifelong friends while residing in the residence halls.

Housing Staff

Activities are administered by full-time professionals, Coordinators of Student Development. They are available to assist residents with counseling, crisis intervention, general referrals, and judicial actions. The Coordinators also supervise desk services and the Resident Advisors.

Resident Advisors, known as RAs, are upperdivision students who understand the challenges faced by new students and try to make the residence hall experience positive and memorable. The RAs are trained in academic advising, event planning, and crisis intervention to assist students through their first year.

Living/Learning Halls

Living/Learning Halls are centered around Cal Poly's academic colleges. Faculty, administrators, and alumni frequently meet with the students in an informal setting. The programming focuses on four fundamental areas: academic development and

support, personal development, professional affiliation, and leadership development. This provides many advantages for residents including direct faculty contact, study groups, events relating to the student's major, and career planning.

Development of a Campus Community

Student representatives are elected in fall term to serve on governing boards in each of the residence halls. Participants contribute to the their hall's community by planning social, recreational, and educational events; and by voicing student-related concerns. Additional opportunities for student involvement are provided by Networks in student community services, recreational sports and multicultural issues.

Convenient On-Campus Housing

Cal Poly's on-campus housing allows the resident convenient access to all campus services and events. Students interested in on-campus housing should return the Housing Application, which is found in the "Notice of Admission" packet, to the Hillcrest Housing Office. Housing licenses are then mailed to students. Priority for housing is generally assigned on a first come, first served basis. Students over 25 years of age should request permission of the Director of Housing. *To receive housing consideration, signed licenses and payment must be returned by the stated deadline.*

Living Expenses for Students in Campus Residence Halls (Subject to Change)

Room and Board are payable in advance or installments (service fee will be charged).

Room, annual license required	\$2,318–2,348
<i>(academic year, double occupancy)</i>	
Board	2,121–2,277
<i>(required, academic year)</i>	
Housing Security Deposit	25
<i>(payable prior to occupancy)</i>	

Off-Campus Housing

The Housing Office maintains off-campus rental information of vacant houses, apartments, mobile homes and an extensive list of private and shared rooms. These listings are for San Luis Obispo and the north and south county areas. Rental information is available by telephone voice mail, (805) 756-5700. The University does not inspect, approve or disapprove any units offered for rent.

PSYCHOLOGICAL SERVICES

Student Services Bldg. (124), Room 119, 805 756-2511 (Voice or TDD)

Psychological Services offer counseling and learning experiences for a variety of students' personal needs such as anxiety and depression, and campus

community improvement. Services include one-to-one and group counseling. In addition to receiving help in a time of transition, students can develop skills in such areas as communication; problem solving; decision making; and, through Testing Services, personality assessments can be done for interested students.

Faculty and staff can consult Psychological Services for help with such areas as group communication, organizational and group processes, test construction and other skills which will improve the learning environment for students. Counseling and Testing Services are located in the Student Services Building, across from the Mustang Stadium.

STUDENT ACADEMIC SERVICES

Hillcrest (81), 805 756-2301

The mission of Student Academic Services is to assist students from targeted underrepresented populations in achieving access to higher education and to promote their ongoing personal and educational success, as well as to assist Cal Poly in attaining its educational equity goals.

Eligible students can utilize a network of academic services, academic advisers and activities, and referrals to additional campus resources. Student Academic Services is a comprehensive program of transition and retention services that are all designed to support academic excellence.

Academic advisers work with each of the six colleges to provide assistance to students with class scheduling, diagnosis of academic skills, graduation planning, career clarification, and related learning and study skills. Specialized instructional and tutorial assistance is available in a variety of small group and individual study sessions.

Student Academic Services incorporates the following:

Academic Skills Center

Fisher Science (33), Room 290, 805 756-1256

Provides study skills programs to increase students' academic success and retention. Study strategies include: study skills assessment, learning styles, time management, listening, note taking, speed reading, how to study for math and science courses, motivation, test preparation, and test taking skills.

Disabled Student Services

University Union (65), Room 202, 805 756-1395, TDD 805 756-1399

Provides information and assistance to students who have either permanent or temporary disabilities. Specialized services include advisement, campus orientation, on-campus transportation, special parking permits, loan of adaptive equipment, and provision of

direct services (readers, note takers, tutors, interpreters).

Educational Opportunity Program

Hillcrest (81), 805 756-2301

Improves access, retention, and graduation rates of educationally disadvantaged, low-income, and/or underrepresented students. Students are provided academic advising, course scheduling assistance, group study tutorials, peer advising, personal and career counseling, and financial aid information.

Minority Engineering Program

Engineering South (40), Room 105, 805 756-1433

Offers comprehensive services designed to promote academic excellence, professionalism, camaraderie, and career preparation for African-American, Hispanic, and Native American students majoring in engineering and computer science.

Student Support Services

Hillcrest (81), 805 756-2301

Provides academic advising, assistance in course selection, tutorial services, and activities designed to prepare low-income students, students with physical disabilities, and/or first-generation college students for academic success.

Summer Institute

Hillcrest (81), 805 756-2301

Provides a select group of freshmen and transfer students with a "mini-summer quarter." Students complete 4-6 units of Cal Poly coursework while living on campus, thus enhancing their academic and university skills.

Upward Bound

Hillcrest (81), 805 756-2301

Motivates and academically prepares local high school students (from groups that are underrepresented at the college level) to pursue a postsecondary education. The academic program and the residential summer school session at Cal Poly offer tutoring, career advisement, supplemental instruction, and cultural and recreational activities.

INTERCOLLEGIATE ATHLETICS DEPARTMENT

Physical Education Bldg. (42), Room 207
(805) 756-2923

John McCutcheon, Director

Steve Beason	Brooks Johnson
Bill Becktel	Eric McDowell
Lisa Boyer	Steve McFarland
Lennis Cowell	Catherine Milligan
Terry Crawford	Jill Orrock
Craig Cummings	Andre Patterson
Laura Decker	Robert Rowell
Phil Earley	Charles Sleeper
Rich Firman	Bill Tripp
Wolfgang Gartner	Steve Yoneda
Eric Jackson	

Intercollegiate Athletics is administered as a separate department, though students participating on its teams receive academic credit for their efforts in courses offered through the Physical Education and Recreation Administration Department.

All the teams, with the exception of wrestling and women's volleyball, compete at the NCAA Division II level. Wrestling and women's volleyball compete at the Division I level. The football program is a member of the Western Football Conference. Wrestling competes in the PAC 10 conference. The balance of the women's and men's programs are in the California Collegiate Athletic Association (CCAA). Through the end of 1991, Cal Poly has won 37 NCAA Division II team titles.

The California State University is committed to providing equal opportunities to men and women CSU students in all campus programs, including intercollegiate athletics.

ADMISSIONS

ADMISSIONS

Admissions Office

Administration Bldg. (1), Room 213

(805) 756-2311, TDD (805) 756-2360

Requirements for admission to California Polytechnic State University, San Luis Obispo, are in accordance with Title 5, Chapter 1, Subchapter 3, of the *California Code of Regulations*. If you are unsure 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 California State University campuses, or at any California high school or community college.

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

Cal Poly 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*).

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, either as described in the admission booklet, or by XAP, Cal Poly's new electronic disk application process. This is the preferred method of application and collects data for both the standard CSU application and Cal Poly's Admission Supplemental Questionnaire (ASQ).

The \$55 non refundable 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. An alternate campus and major may be indicated on the application, but *applicants should list as an alternate campus only a CSU campus that also offers the major*. Generally, an alternate major will be considered at the first choice campus before an application is redirected to an alternate choice campus.

Because all majors at Cal Poly are oversubscribed, it is important to file your application postmarked during the month of the application filing period.

Application Filing Periods

Fall Quarter	November 1–30
*Winter Quarter	June 1–30
*Spring Quarter	August 1–31
Summer Quarter	February 1–28

*Call the Admissions Office for the latest information on applications for Winter and Spring Quarters. Applications postmarked after the filing period will be considered **only** if openings are still available.

Exceptions—applicants to the following programs are admitted to the Fall term only: Architecture, Architectural Engineering, City and Regional Planning, Construction Management, Landscape Architecture, Music, and Applied Art and Design.

THE ADMISSION PROCESS

Admission to Cal Poly is based on the competitive nature of each applicant's admission portfolio. The University utilizes a faculty-mandated multi-criteria selection process. Only candidates submitting an application during the correct filing period will be considered.

All candidates are screened and ranked by major and level: freshmen, lower division transfers or upper division transfers. Freshman candidates are evaluated and selected for admission based on five separate categories including core courses completed, grades earned in core courses, elective courses completed, test scores from either the ACT or SAT, and work experience or extra-curricular activities. Transfer candidates are selected based on completion of major area courses and general education courses, GPA, work experience, and extra-curricular activities.

After your application has been processed and initial transcripts, test scores and required supporting documents have been received, we verify that you have met the CSU admission requirements. We then send you an acceptance letter confirming your eligibility and a Statement of Intent to Register (SIR). It is mandatory that you return your SIR by the date indicated so that a space will be reserved for you.

Statement of Intent to Register Deadlines:

Fall	May 1st
Winter	October 15th
Spring	December 1st
Summer	No Deadline

When your final transcripts are received in the Admissions Office, you will receive your official letter of acceptance. At this time, you will be eligible to register for classes.

Applicants to the majors of Applied Art and Design and Music will be contacted by the department and asked to submit supplementary information. Applied Art and Design applicants will be requested to submit a portfolio, and Music applicants will be required to provide a tape of the applicant

performing or an audition will be scheduled. Admission to Applied Art and Design or Music will then be determined by the major department rather than through the regular selection process.

If you are not granted space at Cal Poly, but you listed an alternate campus on your application, your application will automatically be redirected to that campus *if* they still have openings in your major. However, we suggest you file separate applications with other CSU campuses that offer your major.

Hardship Petitions

The campus has established procedures for consideration of qualified applicants who would be faced with extreme hardship if not admitted to Cal Poly. Petitioners should write the Admissions Office regarding specific policies governing hardship admission. In general, a secondary review is granted to permanent San Luis Obispo County resident upper-division transfer students who, because of financial reasons or family obligations, would be unable to leave the area to continue their education. This action is initiated by a letter to the Director of Admissions from a **denied** applicant outlining the reasons why consideration through hardship should be granted.

UNDERGRADUATE ADMISSION REQUIREMENTS

FRESHMAN REQUIREMENTS

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 section on Eligibility Index), and
- (3) have completed with grades of C or better each of the courses in the comprehensive pattern of college preparatory subject requirements (see "Subject Requirements"). Courses must be completed prior to the first enrollment at Cal Poly.

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").

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 ACT composite score. 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 resident of California for tuition purposes, you need a minimum index of 3402 (SAT) or 842 (ACT).

If your grade point average is 3.00 or above (3.61 for nonresidents), you are exempt from submitting test scores. However, you are urged to take the SAT or ACT since all campuses use test results for advising and placement purposes.

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.

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

Provisional Admission

Cal Poly may provisionally admit first-time freshman applicants based on their academic preparation through the junior year of high school and planned for the senior year. The campus 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.

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

GPA	2.00 *	2.20	2.40	2.60	2.80	3.00 **
ACT Score ...	30	26	22	18	14	
SAT Score	1200	1040	880	720	560	

* Below 2.00 does not qualify for regular admission.

** 3.00 and above qualifies with any score.

Honors Courses

Up to eight semesters of honors courses taken in the last two years of high school can be accepted. Each unit of A in an honors course will receive a total of 5 points; B, 4 points; and C, 3 points.

Subject Requirements

Cal Poly 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 intermediate algebra.
- 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.

If you have completed at least 15 college preparatory units, you may offset a one-unit shortage in one subject area by completing an extra unit in another subject area. This option is available from fall 1992 through summer quarter 1995. Although you will be granted regular admission under this option, you are strongly advised to complete all courses in the college preparatory pattern, especially Mathematics and English, so you will be adequately prepared to begin your university studies. Please see your high school counselor for further information.

Foreign Language Subject Requirement

The foreign language subject requirement may be satisfied by 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 a campus admission officer for further information.

Subject Requirement Substitution for Students with Disabilities

Applicants with disabilities 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 or hearing impaired, are blind or visually impaired, or have learning disabilities, 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 Cal Poly's 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 to 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.

TRANSFER REQUIREMENTS

You will meet qualifications 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").
2. You were eligible as a freshman at the time of high school graduation and have been in continuous attendance at an accredited college since high school graduation.
3. 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.
4. 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.

Transferable courses are those designated for baccalaureate credit by the college or university offering the courses.

Making Up Missing College Preparatory Subject Requirements

Undergraduate 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. One college course of at least three semester or four quarter units will be considered equivalent to one year of high school study.
3. Earn acceptable scores on specified examinations.
4. If you have 56 or more semester (84 quarter) units, you may complete one of the following alternatives:
 - (a) *1987 or earlier high school graduates*: complete the CSU general education requirements in communication in the English language (at least 9 semester units) and mathematics (usually 3 semester units) with a C or better in each course;
 - (b) *1988 or later high school graduates*: complete a minimum of 30 semester (45 quarter) units, with a C or better in each course, chosen from courses in English, arts and humanities, social science, science, and mathematics of a level at least equivalent to courses that meet general education 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 an admissions officer for further information about alternative ways to satisfy the subject requirements.

TEST REQUIREMENTS

Freshman and transfer applicants who have fewer than 56 semester or 84 quarter units of transferable college credit must submit scores, unless exempt (see "Eligibility Index"), from either the Scholastic Aptitude Test (SAT) of the College Board or the American College Testing Program (ACT). If you are required to submit test scores, you should take the test no later than November. Test scores are also used for advising and placement purposes. Registration forms and dates for the SAT or ACT are available from high school or college counselors, or from a CSU campus testing office, or you may write or call:

American College Testing Program (ACT)

Registration Unit, P.O. Box 168
Iowa City, Iowa 52240
(319) 337-1270

The College Board (SAT)

Registration Unit, P.O. Box 592
Princeton, New Jersey 08541
(609) 771-7588

TOEFL Requirement

All undergraduate applicants, regardless of citizenship, who have not attended schools at the secondary level or above for at least three years full time where English is the principal language of instruction must present a score of 550 or above on the Test of English as a Foreign Language (TOEFL). Applicants should take the TOEFL at least six months prior to the term applying for in order for scores to be received in time for full consideration in the selection process.

OTHER ADMISSIONS INFORMATION

RETURNING STUDENTS

Matriculated students who have not registered for three consecutive quarters and have not been on an approved leave of absence must file an application for readmission before the deadline dates listed below. The application fee must accompany the application for readmission.

Matriculated students who have not registered for one quarter or two consecutive quarters will be entitled to their registration priority without applying for readmission. Summer Quarter is a regular quarter and is counted in determining the length of absence.

Application Deadlines for Returning Students

Summer Quarter.....April 1
Fall Quarter.....July 1
Winter Quarter.....October 1
Spring Quarter.....March 1

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 all of the following conditions:

1. Possesses a high school diploma (or has established equivalence through either the Tests of General Educational 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 last 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 student and will include an assessment of basic skills in the English language and mathematical computation.

California Residents Sixty Years of Age or Older

California residents who are sixty years of age or older may enroll in regular session courses without payment of certain specified fees and with reduction in levels of others under the provisions of this alternative to regular admissions. Enrollment is subject to the following conditions:

- Persons enrolled shall be eligible for admission as set forth in Title 5 of the *California Code of Regulations*.
- Persons enrolling shall be registered after regular students, on a space-available basis.

For information regarding application procedures and admissions, contact the Admissions 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.

INTERNATIONAL (FOREIGN) STUDENT GENERAL ADMISSION REQUIREMENTS

Undergraduate and Graduate Application Deadlines:

Fall Quarter June 1st
Winter Quarter October 1st
Spring Quarter February 1st
Summer Quarter April 1st

To be considered for admission to an undergraduate or graduate program, you must have graduated from a secondary, higher secondary, or tertiary institution which is

recognized by the Ministry of Education. International applicants must have their admission portfolios completed by the deadline dates listed above. A completed portfolio includes: official transcripts from all schools attended showing evidence of graduation from secondary school and all coursework and any certificates or degrees received. All official documents must be submitted in native language and accompanied by a certified English translation; two letters of reference from instructors or professors; confidential financial statement; certificate of health; International Education Background form; and a Test of English as a Foreign Language with a score of 550 or more. Official proof of university graduation must be sent directly by the institution, and a Test of Written English with a score of 4.5 must be included.

After all required forms and academic documents have been received, we will determine your eligibility for admission and notify you of the results. If admitted, you will receive a Certificate of Eligibility (I-20 form) which is necessary to obtain a student visa to enter the United States or for requesting permission from the U.S. immigration and Naturalization Service for you to transfer to Cal Poly from another U.S. school. The I-20 form is valid for enrollment only at Cal Poly for the quarter indicated, and includes an expiration date. If it is necessary to change your application to another term, you must make your request in writing and another application fee may be required.

GRADUATE ADMISSIONS

For information regarding graduate application procedures and admissions, see the "Graduate Programs" section of this catalog.

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, and 89705–89707.5, 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 appointment of a guardian for the minor, so long as the minor's parents are living.

A married person may establish his or her residence independent of his or her 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.

Residence determination dates

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

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

There are 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. Effective January 1, 1994, this exception continues until the military personnel has resided in the state the minimum time necessary to become a resident.
6. Dependent children of a parent 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, California 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.

FEES

EXPENSES

a n d

FINANCIAL AID

FEES AND EXPENSES

STATE UNIVERSITY FEE

The State University Fee is divided into two categories depending on the number of units for which a student is registered. Students may register for up to six units per quarter at the lower rate. The higher rate is charged if the total units taken during the quarter exceeds six.

SCHEDULE OF FEES

All regularly enrolled students, both undergraduate and graduate, pay registration fees determined by the number of units per quarter. Legal residents of California are not charged tuition. In addition to registration fees, nonresident and foreign students pay tuition fees. Students who have already earned a degree equal to or higher than the one for which they are enrolled are charged Duplicate Degree Tuition, but do not have to pay the State University Fee.

If your check is returned by the bank for any reason, your registration may be cancelled and you will be charged a returned check processing fee.

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.

Registration Fees Per Quarter

Fees listed below were in effect at the time this catalog was printed and are for informational purposes only. This list is not to be used as a schedule of current fees. Unless otherwise noted, fees indicated are per quarter. The total fee paid per term will be determined by the number of units taken, including those in excess of fifteen.

Fees and tuition are subject to change without advance notice by the Trustees of The California State University. Please consult the current *Class Schedule* for the fees that are applicable to the quarter in which you are registering.

	0-6.0 units	more than 6 units
State University Fee:		
Undergraduates	\$344.00	\$594.00
Graduates	360.00	624.00
Associated Students Fee	20.00 *	20.00 *
Facility Fee	2.00	2.00
Instructionally Related Activities		
Fee	45.00	45.00
Health Plan Fee	28.00	28.00
University Union Fee	56.00 *	56.00 *
Campus Services Card	2.00	2.00
Total registration fees per quarter:		
Undergraduates	\$497.00	\$747.00
Graduates	513.00	777.00

* Fall quarter fee; other quarters may be slightly lower.

Late Registration

Late registration fee (See *Class Schedule* for dates when this fee will be assessed.) \$25.00

Tuition for Nonresident Students

Nonresident tuition (in addition to other fees charged all students) *per quarter unit* \$164.00

Room and Board (On-Campus)

Room, annual license, double occupancy.

Fees indicated do not include deposit.

Academic year..... \$2,313.00

Summer quarter 771.00

Meals (approximate cost)

19 meals per week, academic year..... \$2,199.00

14 meals per week, academic year..... 2,046.00

Parking Fees

Less than 4-wheel vehicle, 25% of listed fee.

Quarterly \$36.00

Quarterly pool (2 or more vehicles), each pool. 36.00

Daily permits..... 1.50

Weekly permits..... 3.60

Miscellaneous Fees

Application fee (nonrefundable)..... \$55.00

Check returned for any cause..... 10.00

Copy of student records, up to 4 pages (\$.25 each additional page) 1.00

Extension course fees (per quarter unit):

Lecture and discussion 70.00

Activity..... 85.00

Laboratory..... 110.00

Administrative (contract) 20.00

Failure to meet administratively required

appointment or time limit..... 2.00 to 20.00

Instrument use fee (Music) 5.00

Library fees see schedule in library

Special examination fee (per examination).... cost to 25.00

Sponsored Student Fee (per quarter) 250.00

Thesis binding fee 15.00

Second copy if required by department 7.50

Transcript of academic record (cost varies with number ordered)..... 4.00

DUPLICATE DEGREE TUITION

The California State University is required by law to charge duplicate degree tuition of \$100 per quarter unit up to a maximum of \$1,500 per quarter to any student who has earned a degree equivalent to or higher than the degree awarded by the program in which the student is enrolled or who has earned a baccalaureate or postbaccalaureate degree and is enrolled without a declared degree objective.

The following categories are exempted from Duplicate Degree Tuition:

1. A dislocated worker as certified by a state agency in accordance with Title 3 of the Federal Job Training Partnership Act.
2. A displaced homemaker as defined in accordance with the Higher Education Act of 1965, as amended (20 USC 1001 et seq.)
3. A person who is an enrollee in any program leading to a credential or certificate that has been approved by the Commission on Teacher Credentialing.
4. A recipient of benefits under the Aid to Families with Dependent Children program, the Supplementary Security Income or State Supplementary Program, or a general assistance program.
5. A nonresident student except those for whom nonresident tuition has been waived.
6. A California resident who is sixty years of age or older.
7. Children and dependents of deceased or disabled veterans.
8. Children of deceased law enforcement or fire suppression prevention employees.

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 42201 (parking fees), 41913 (nonresident tuition), 42019 (housing charges), and 41802 (all other fees) of Title 5, *California Code of Regulations*. In all cases it is important to act quickly in applying for a refund. Information regarding which fees may be refunded and the appropriate procedures to follow is published in the quarterly *Class Schedule* in the section entitled "Additional Registration Information." Information concerning any aspect of the refund of fees may be obtained from the Academic Records Office or the University Cashier.

DEBTS OWED TO THE UNIVERSITY

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.

CREDIT CARDS

VISA and Master Charge bank credit cards may be used for the purchase of meal tickets from the University Foundation, theatre tickets from the Cal Poly Theatre Box Office, health services from the University Health Center, Bookstore purchases and for Extended Education fees. No other use of credit cards is authorized.

PROCEDURE FOR THE ESTABLISHMENT 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 two-thirds of those students voting. The Student Body Fee was established at California Polytechnic State University, San Luis Obispo by student referendum on May 22, 1991. The same fee can be abolished by a similar two-thirds approval of students voting on a referendum called for by a petition signed by 10% of the regularly enrolled students (*Education Code*, Section 89300). The level of the fee is set by the Chancellor. An increase in the student body fee may be approved by the Chancellor only following a referendum on the fee increase approved by a majority of students voting. Student body fees support a variety of cultural and recreational programs, child care centers, and special student support programs.

FINANCIAL AID

Financial Aid Office
Administration Bldg. (01), Room 212
(805) 756-2927

The university has a variety of grants, loan funds, scholarships, and part-time employment opportunities designed to assist students financially. Students who need assistance in order to complete their college work should read this section carefully. Additional current information may be obtained by writing to the Financial Aid Office for a copy of the Financial Aid brochure.

The application for Financial Aid is called the Free Application for Federal Student Aid (FAFSA). It may be obtained from any university or college financial aid office or any California high school. Scholarship applications must be requested directly from the Financial Aid Office. The deadline for filing the FAFSA with the processor is **March 2**.

TYPICAL STUDENT EXPENSES

Following are the typical expenses per quarter during the 1993-94 academic year for the average California resident student attending Cal Poly. Charges for room and board are payable in advance or in installments. Nonresident students should be prepared to pay additional tuition and fees. For the 1993-94 school year nonresident tuition was an extra \$164 per unit. Duplicate degree tuition will be charged to students who have already earned a degree equivalent to or higher than the degree awarded by the program in which the student is enrolled. Duplicate degree tuition is \$100 per unit. Students in this category must pay campus fees (\$140) in addition to Duplicate Degree Tuition, but do not have to pay the State University Fee.

Please see the "Fees and Expenses" section for more information. All State fees are subject to change upon approval by the Board of Trustees of The California State University.

Estimated Expenses per Quarter:

Registration fees	747
Room and board with 14-meal ticket	1,588
Books and supplies (estimated) *	204
Personal expenses and transportation	697
Estimated total per quarter	\$3,236

* Beginning engineering and architecture students should be prepared to pay up to \$250 in their first quarter for books and supplies.

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.

UNIVERSITY SCHOLARSHIPS

General Information

Over 1100 scholarships a year are awarded or confirmed by the Cal Poly Scholarship Committee. Applications are received by the Financial Aid Office for the Scholarship Committee. Members review each student's financial need, scholastic ability, participation in school and community activities, honors and organizational affiliations, and educational objectives. Some Cal Poly scholarships have additional requirements which relate to a particular concentration or field of study, residential origin, class level, and project or design portfolios.

Generally, a student must have at least an over-all grade point average of 3.0 to be granted a scholarship. There are some scholarships, however, that are awarded to students with lower grade point averages if they meet certain criteria such as need, field of study, or high school.

If you are in doubt about your eligibility or have not received word on your admission status to Cal Poly, be sure to apply by the filing deadline.

How to Apply

Annual Deadline Date:

March 2 for the following academic year

The Cal Poly Scholarship Application (available in January from the Financial Aid Office) should be filled out completely. A reference form is included as part of the application, and it should be completed by an individual who can attest to the student's ability to profit from a college education, need for financial assistance, leadership abilities, and interest and participation in school activities. A parent or close relative cannot be considered as a reference. To determine financial need, the FAFSA must also be filed. For

priority consideration for financial aid programs and Cal Poly scholarships, the FAFSA should be mailed to the processor by **March 2**.

Scholarship Notifications

Typically, the Cal Poly Scholarship Committee meets in early spring to award and confirm scholarship awards. In late spring, scholarship award letters will be sent to recipients. Scholarship amount, disbursement and donor information are included. Recipients must maintain full-time enrollment while receiving the scholarship (extended education, concurrent enrollment and other college units are excluded). Some scholarships require that recipients will have earned at least one-half the value of the scholarship during the previous year.

Scholarships are awarded for an academic year and are typically disbursed in increments each quarter. Non-attendance will result in cancellation or a prorated amount.

Students not selected will be notified during the summer. However, applications will remain active for the academic year. Should a scholarship become available, a current applicant in good standing may be considered.

SCHOLARSHIPS

General Scholarships

Alumni Honor Scholarships
 R. W. Andrews Scholarships
 Paul and Barbara Boberg Scholarship
 Lulu Grumbles Bumphrey Scholarships
 Cal Poly State University Memorial Scholarships
 Cal Poly Women's Club Scholarship
 Cal Poly Alumni—Peninsula/South Bay Chapter Scholarships
 Cal Poly East Bay Alumni Chapter Scholarship
 Cal Poly Parents' Association Scholarships
 California Rural Rehabilitation Scholarships
 Felix Camacho-Betteravia Farms Scholarships
 Central California Women's Conference Scholarship
 Herbert E. Collins Scholarships
 Maurice E. Coulter Scholarship
 CSU Graduate Equity Fellowships
 Educational Equity Scholarships
 Pat Elliot Memorial Award
 Ford/EEOC Scholarships
 Ralph V. Fullwiler Scholarships
 Green and Gold Barbecue Scholarship
 Jennifer Jess Hemstreet Memorial Scholarship
 Regnar Hessellund Scholarships
 Michelle Ann Jacobson Memorial Scholarship
 Land Outstanding Service Award
 Ian McMillan Memorial in Environmental Activism Scholarship
 Julian A. McPhee Award
 Modesto Alumni Boosters Scholarships
 Morro Bay Woman's Club Scholarship
 National Pro-Am Youth Fund Scholarships
 PEF Packaging Professionals Scholarship
 Phi Kappa Phi Award

Rose Parade Float Award
 Army—ROTC
 L. Diane Ryan Scholarship
 Helen V. Sandercock Scholarships
 William and Adelaide Sandercock Scholarships
 Sheila and Yosef Tiber Scholarships
 William B. Turner Scholarships
 J. W. Van Dyke Memorial Scholarships
 Ralph R. Wilmar Rodeo Queen Scholarship
 Mildred and Charles Wolverton Scholarships
 Ed J. Zuchelli Memorial Scholarship

Agriculture

Catherine C. Adams Scholarships
 Barling Memorial Scholarship
 Paul L. Belveal Memorial Scholarships
 Danny Bettencourt Memorial Scholarships
 Harold G. Bradshaw Scholarship
 Herbert Hopkins Burlingham and Ruth Hembree Burlingham Scholarship
 California Agri-Fair Scholarships
 California Association of Nurserymen—Peninsula Chapter Scholarship
 California Cattlewomen Scholarship
 California Congress of Parents, Teachers and Students (PTA) Scholarship
 California Creamery Operators Association Scholarship
 California Dairy Industries Association Scholarship
 California League of Food Processors Scholarship
 California State Grange Scholarships
 William, Joseph and Charles Cattaneo Scholarship
 CIBA-Geigy Scholarship for Minorities in Agriculture
 Carl A. Cilker Scholarship
 William H. Cilker Scholarship
 Claire Davis Clark Scholarship
 Concord Farm Bureau Scholarship
 Sandra Crabtree Memorial Scholarship
 Rosario Curletti Scholarships
 Dr. Arnold Dean Scholarships
 General Dillingham Produce Industry Scholarships
 Kenneth H. Easter Scholarship
 Environmental Industries, Inc. Scholarship
 Paul Etchechury Memorial Scholarship
 Gerald H. Fairbairn Scholarship
 Woody Frey Scholarship
 J. Corder Gibson Scholarship
 Ray Hansen Memorial Scholarship
 William Randolph Hearst Foundation Scholarships
 William (Ben) and Helen Holman Alumni Scholarship
 Harold G. Hull Graduate Assistantships
 International Agriculture Fellowships
 Corwin M. Johnson Scholarship
 Richard F. Johnson Scholarship
 Ted and Dottie Kasinak Scholarship
 Kings River Prune and Apricot Scholarships
 Knight Brothers Scholarships
 Knudsen Foundation Scholarships
 E. C. Loomis and Son Scholarship
 Los Angeles County Fair Association Scholarship
 Lucky Stores Scholarships
 Chester O. McCorkle, Sr. Memorial Scholarship

Dr. Ole Meland Scholarship
 Lou Merrill Scholarship
 James F. Merson Memorial Scholarship
 NAMA/West Scholarship
 Natural Resource Management Scholarships
 Don Nikkel Memorial Scholarship
 Harry Parker Award
 Charles and Helen Penwell Scholarships
 Roger B. Peters Award
 Pi Alpha Xi-Howard C. Brown Scholarship
 Dante Righetti Scholarship
 Rodeo Boosters Achievement Award
 Rodeo Club Scholarships
 Burton Douglas Salisbury Memorial
 Jean Eddy Sander Rodeo Queen Award
 Fred and Marian Sandercock Scholarships
 San Luis Obispo Lions Club/ Food Industries Scholarship
 Vard M. and Mildred P. Shepard Memorial Scholarship
 Oben J. (Ben) Simonson Scholarship
 Louis H. and Stella S. Soares Achievement Award
 Herman M. Sperber Memorial Scholarship
 Stardust Jersey Farm Scholarship
 Sunwest Foods Scholarship
 Harmon M. Toone Scholarship
 Eric C. Twist Memorial Scholarships
 War Veterans Scholarship
 Richard A. (Alex) Wilson, Jr. Memorial Scholarship
 Leopold Edward Wrasse Scholarships

Architecture and Environmental Design

Stephen O. Anderson Memorial Scholarship
 Beavers Heavy Construction Scholarship
 Bechtel Corporation Scholarships
 Robert Bein, William Frost & Associates—Sean Rogers
 Memorial Scholarship
 Douglas W. Butzbach Memorial Scholarship
 Don Chapin Company Scholarship
 City and Regional Planning Scholarships
 Richard Lee Fisher Memorial Scholarship
 Thor Gulbrand, AIA Memorial Scholarship
 D. Stewart Kerr Scholarship
 Don and Caryl Koberg Architecture History Scholarship
 Landscape Architecture Scholarship and Award Fund
 Alice C. Loh Competition Award
 Warren Ludvigsen Memorial Scholarship
 Dr. Glenn G. McRae Internship
 Julia Morgan/Phoebe Hearst Assistantships
 Robert Itifumi Odo Memorial Scholarship
 Oltmans Construction Company Scholarship
 Professional Architects Scholarship
 Frederick Peter Young Scholarships

Business

Andersen Consulting Accounting Scholarship
 Andersen Consulting Outstanding Junior Management Award
 Mickie Burris Award
 California Congress of Parents, Students and Teachers (PTA)
 Scholarship
 Central Coast Controllers' Association Scholarship
 Clorox Company Scholarship

Daryl Damon Memorial Scholarship
 Milton Drandell Memorial Award
 Ernst & Young Scholarship
 Frank and Norma Exter Scholarship
 Industrial Technology Society Scholarships
 KPGM Peat Marwick Scholarship
 Jeffrey W. Land University and Community Service
 Scholarship
 James R. Landreth, Vice President for Business Affairs
 Emeritus Scholarship
 John S. and Janice B. Maher Scholarships
 Merrill Lynch FMA Student Award
 Northrop Ventura Management Club Scholarship
 Price Waterhouse Scholarship
 Larry Ratner Scholarship
 Touche Ross Scholarship
 Leopold E. Wrasse Scholarship

Engineering

Alcoa Foundation Scholarships
 Adele and Aldo Alessio Scholarships
 American Institute of Aeronautics and Astronautics,
 Vandenberg Section Scholarships
 American Society of Heating, Refrigeration and Air-
 Conditioning Engineers Scholarships (ASHRAE)
 San Jose Chapter
 Southern California Chapter
 Andersen Consulting Outstanding Junior Awards in
 Aeronautical Engineering
 Computer Science
 Mechanical Engineering
 Andersen Consulting Outstanding Junior in Industrial
 Engineering Scholarship
 Association of Old Crows Scholarship
 Bechtel Corporation Scholarships
 Boeing Company Scholarships
 Don Chapin Company Scholarship
 Chevron USA Inc. Scholarships
 Allan R. Davis Scholarship
 Environmental Research Foundation Award
 William Squires Fowler Scholarship
 Harold R. Frank—Applied Magnetics Corporation
 Scholarships
 Karl Arne Gulbrand Memorial Scholarship
 Glenn A. Hubbard Memorial Scholarship—Experimental
 Aircraft Association
 Charles E. and Pearl P. Knott Memorial Scholarships
 Litton Industries Scholarships
 Mechanical Engineering Scholarship
 Dragoslav M. Mistic Scholarship
 George and Tonny Murray Scholarship
 National Action Council for Minorities in Engineering
 Scholarships
 Northrop Scholarships
 Frank E. Pilling, Sr. Scholarship
 Roy N. Poage Memorial Scholarships
 Raychem Scholarships
 Raytheon Company Scholarships
 Doral Sandlin Aircraft Design Award
 Siemens Pacesetter Scholarship
 Shell Western E & P Minority Development Scholarship

Society of Manufacturing Engineers Student Chapter—Leo E. Rogers Memorial Scholarships
 Jack and Alice Spaulding Mechanical Engineering Scholarship
 Gregory Stines Memorial Scholarship
 Morris P. Taylor Memorial Scholarship
 Toyota Scholars Program Scholarship
 Unocal Scholarships
 Dutch and Gladys Van Harreveld Scholarships
 Varian Scholarships
 Andrew Wacht Scholarship
 Charles (Chuck) Peter White Scholarship
 Charles Wiswell Scholarship
 Ziatech Corporation Scholarship

Liberal Arts

Cal Poly Band Scholarship
 John Bayliss Broadcast Scholarships
 Harold P. and Rosalie Davidson Award
 James M. Duenow Scholarship
 Christopher Frair Scholarship
 Jay Garner Memorial Scholarship
 Ann and Gordon Getty Scholarship
 Graphic Communication Scholarship
 Gravure Scholarship
 Elizabeth Hanlon Parks Memorial Scholarship
 Robert S. Harmon Scholarship
 Jim Hayes Journalism Scholarship
 Mary Lou Hughes English Excellence Scholarship
 Evelyn V. Johnson Scholarship
 Janet Lee Memorial Award
 Darren E. Loyd Photography Scholarship
 John H. Lynn Political Science Award
 John S. and Janice B. Maher Scholarships
 Lucian Morrison Memorial Scholarship
 Music Department Memorial Award
 Music Faculty Scholarship
 Willard "Pete" Pederson Scholarship
 Quebecor Printing Scholarship
 Ronald V. Ratcliffe Award
 Larry Ratner Scholarship
 Beatrice A. Rice Scholarship
 Eve Strong Memorial Scholarship
 Tag and Label Manufacturer's Institute Scholarship
 Lloyd Tevis Award
 Jeri Ewy Thiel Memorial Scholarships
 Guy Thomas Memorial Scholarship
 Vocal Studies Scholarship
 Carolyn and Larry Voss Music Scholarship
 Ralph and Florence Welles Award
 Ralph R. Wilmar Classical Piano Scholarship

Science and Mathematics

Andersen Consulting—Kappa Mu Epsilon Scholarship
 Applegarth Biology Scholarships
 Beta Beta Beta Biological Society Scholarships
 Biological Sciences Scholarships
 CAHPERD Scholarship in Honor of Robert A. Mott
 Chemistry Faculty Scholarship
 Clyde P. Fisher Memorial Scholarship

Volmar A. and Viola I. Folsom Scholarships
 Jerry Lee Frederick Memorial Scholarship
 Hatfield Memorial Award
 Robert E. Holmquist Memorial Scholarship
 John David Jackman Memorial Award
 W. Boyd Judd Scholarship
 David Keeling Scholarship
 Katrina J. Killgore Memorial Scholarship
 David Kittredge Memorial Scholarship
 KME Founders Award
 George C. Laumann Scholarship
 E. H. "Woody" Lehman Memorial—Natural History Scholarship
 Barbara Lee Lincoln Memorial Award
 Marine Biology Scholarship
 Margaret McCormack Scholarship
 Microbiology Scholarship
 Robert Mott Memorial Scholarship
 Mu Delta Phi Scholarship
 Sarah Perryman Memorial Award
 Robert and Elva Rodin Botanical Scholarship
 Sierra Vista Hospital Volunteers Auxiliary Scholarships
 Mary E. Smith Memorial Marine Biology Award
 Ralph M. Warten Memorial Scholarship
 Harold J. Watson Memorial Scholarship
 Ralph E. Weston Memorial Award
 Kevin Wright Memorial Scholarship

University Center for Teacher Education

California Retired Teachers Association - Laura E. Settle Scholarship
 Calista Cheek Affirmative Action Scholarship
 Michael and Josephine Cappellotti Scholarship
 Teacher Diversity Scholarship

Athletics

Jon Robert Andrews Memorial Scholarship
 Mickie Burris Award
 Charles Daum Memorial Scholarship
 Hall of Fame Scholarships
 Berdy Harr Memorial Scholarship
 Musselman Wrestling Scholarships
 Mustang Booster Athletic Scholarship

Other Scholarships

In addition to the scholarships awarded by the University, many awards from various private donors and organizations are available to assist students in meeting University expenses. Interested students should make inquiries for such awards directly to the sponsoring organization.

Currently, Cal Poly students are the beneficiaries of well over a million dollars of outside scholarship assistance each year.

LOANS

Loans are for educational purposes only, with definite provisions for repayment. There are four types: Federal Perkins Loans, Federal Parent Loans (PLUS), Federal Stafford Student Loans (formerly Guaranteed Student Loans), and Cal Poly Long-Term Emergency Loans. Also available are emergency loans of small amounts, interest free, over a short-term period.

Federal Perkins Loans

The Federal Perkins Loan is a five percent interest loan available to both undergraduate and graduate students. Annual amounts are based on the students' need as determined by the Financial Aid Office. Repayment begins six to nine months after the student leaves school or ceases to be at least a half-time student. The government pays the interest while the student is in school and during the grace period. There are cancellation and deferment provisions. The application for this loan is the FAFSA which must be submitted by March 2 for the upcoming school year.

Federal Parent Loans (PLUS)

Federal Parent Loans (PLUS) enable parents to obtain annually adjusted variable interest loans (not to exceed ten percent) for educational costs through banks and other lending institutions. A PLUS loan goes into repayment when the loan is made. To apply, contact the Financial Aid Office.

Federal Stafford Loan

The Federal Stafford Loan program was established to make loans to students through lending institutions such as banks and credit unions. Annual amounts are based on the students' need as determined by the Financial Aid Office and federal limits. The federal government will pay the interest on the loan while the student is in school and there are deferment provisions. The FAFSA must be on file in order to determine need. Stafford Student Loan applications are available from the Financial Aid Office.

Federal Unsubsidized Stafford Loan

Students who are ineligible for some or all of a subsidized Federal Stafford Loan may borrow using the Unsubsidized Stafford Loan program. With the exception of demonstrated financial need, borrowers must meet all eligibility criteria of the regular Stafford Loan program. Interest payments begin immediately after the loan is disbursed or the borrower may add the interest to the amount owed. The Federal Supplemental Loan for Students (SLS) program has been discontinued for the 1994-95 school year and beyond; accordingly, an additional amount of Unsubsidized Stafford Loan, above the normal Stafford limit, may be available to independent students and to dependent students whose parents are denied a PLUS Loan.

University Emergency Student Loans

This program was designed to assist students in coping with unanticipated educationally-related financial emergencies. Loans from these funds are made for varying periods of time and amounts, according to the regulations and conditions prescribed in the establishment of the particular loan fund. The following types of loans may be made by obtaining applications from the Financial Aid Office:

University Long-Term Emergency Loans are granted to students who demonstrate a long-term educational need. They are approved by a standing loan committee on the basis of written applications, recommendations, and interviews. Interest rates charged on the unpaid balance during the repayment period range from four to ten percent depending on donor requirements. Accrual usually begins after the specified due date, graduation, or withdrawal from the university. A one percent service charge is deducted from the loan disbursement.

University Short-Term Emergency Loans are granted for unexpected emergency situations. A maximum of \$300 may be borrowed during one quarter. Repayment is usually due at the end of the quarter in which the loan was received. A one percent service charge is deducted from the loan disbursement and 12 percent interest is charged on any unpaid balance remaining after the agreed upon due date.

University Emergency Student Loans include donations received from the following:

Agricultural Engineering Loan Fund
 Alumni Loan Fund
 American Society of Heating, and Air Conditioning Loan Fund
 American Welding Society Loan Fund
 Lamar Anderson Memorial Loan Fund
 Student Architect Wives' Club Loan Fund
 Marie Van Aspersen Memorial Loan Fund
 Bachino Loan Fund
 Baer-Beck Loan Fund
 Edgar E. Bilodeau Loan Fund
 Jed S. Blake Memorial Loan Fund
 CFFA/Agricultural Education Loan Fund
 California Association of Agriculture
 Laboratories Loan Fund
 California Association of Resource Conservation Districts
 Loan Fund
 Cal Poly Women's Club Fund
 California Retired Teachers' Association Loan Fund
 W. B. Camp Loan Fund
 C.A.R.S.E.S. Loan Fund
 Logan S. Carter Loan Fund
 Margaret Chase Memorial Loan Fund
 Herbert E. Collins Loan Fund
 Thomas J. Comer Memorial Loan Fund
 Cooperative Education Loan Fund
 Harlan Diedrichsen Memorial Loan Fund
 Esther Biaggini Dugan Loan Fund
 Environmental Protection Agency Loan Fund
 1960 Football Team Memorial Loan Fund
 Independent Order of Foresters Loan Fund

Anita M. Hathaway Loan Fund
John Holley Memorial Loan Fund
Ralph Hoover Loan Fund
Horsehoeing and Animal Husbandry Loan Fund
Lydia Humphrey Memorial Fund
Impact Publishers Loan Fund
International Students Loan Fund
Chris Jespersen Loan Fund
Fred Kimball Loan Fund
William Kirkpatrick Memorial Loan Fund
Alfred M. Kretzmann, Jr., Memorial Loan Fund
Lee Gird Levering Memorial Loan Fund
Lynn T. Lobaugh Memorial Loan Fund
Robert W. and Hazel W. Lutz Loan
Metal Heat Treating Association of California Loan Fund
Nissen Educational Loan Fund
Ornamental Horticulture Loan Fund
Janet Penfold Memorial Loan Fund
Mary T. Pollock Memorial Loan Fund
Rotary Loan Fund
San Fernando Valley Club of Printing House Craftsmen Loan Fund
George Schlmeyer Memorial Loan Fund
Sears Roebuck Loan Fund
Norma Sullivan Memorial Loan Fund
Telegram-Tribune Loan Fund
Todd Farm Loan Fund

GRANTS

Federal Pell Grant

This is a program designed to help undergraduates pay for their education after high school. The amount a student is eligible for depends on their Expected Family Contribution, the cost of education, full-time or part-time enrollment status, and how many quarters during the year they will be enrolled. Pell Grant eligibility is usually limited to 5 full years of undergraduate study. Eligibility may be extended for a sixth year if the undergraduate program requires more than four years to complete a bachelor's degree. Students applying for other aid through the use of the FAFSA may apply for the Pell grant at the same time.

Federal Supplemental Educational Opportunity Grant Program

The Federal Supplemental Educational Opportunity Grant Program (SEOG) is a grant program to assist undergraduate students who have a substantial financial need and who, without this aid, could not attend college. To be considered for this grant, applicants must submit a FAFSA to the processor by March 2 for the upcoming school year.

Federal Work-Study Program

The Federal Work-Study Program (FWS) is a need-based program which provides employment for students to assist them in completing their education. It is intended that work-study jobs not only assist the student financially but also provide pertinent work experience. Students awarded FWS can be referred to jobs located either on- or off-campus with

approved departments/agencies. Pay rates vary depending on the job requirements and the student's skills. To receive priority consideration for this program, applicants must submit the FAFSA to the processor by March 2 for the upcoming school year.

Cal Grant A

This program awards money to middle- and low-income undergraduates. New awards are limited to students having freshman, sophomore or junior status. To apply to become a new winner of this grant, complete a FAFSA and a GPA Verification Form by March 2 for the upcoming school year. Renewal applicants must send the completed FAFSA by **March 2**.

Cal Grant B

This program assists high-potential undergraduates from disadvantaged/low-income backgrounds. To apply to become a new winner of this grant, complete a FAFSA and a GPA Verification Form by **March 2** for the upcoming year. Renewal applicants must send the completed FAFSA by **March 2**.

State Educational Opportunity Program Grant (SEOP)

The SEOP grant is designed to assist students who have been admitted to the university through the Educational Opportunity Program (EOP). Undergraduate EOP students are considered for this grant when they file the FAFSA for the upcoming school year by **March 2**.

State University Grant (SUG)

This state-funded program has been implemented to provide grants to offset the increased State University Fee. SUG is available to undergraduate and graduate students who are California residents and show financial need. To apply, file the FAFSA by **March 2** for the upcoming year.

STATE AID TO THE PHYSICALLY HANDICAPPED

The State Department of Vocational Rehabilitation provides financial assistance to students who have physical disabilities. This assistance equals the necessary school expenses and may include additional funds to help cover the cost of living. Students entitled to this assistance desiring more information and application procedures should contact the Department of Vocational Rehabilitation.

**ACADEMIC
REQUIREMENTS**

a n d

POLICIES

Academic Placement

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 admissions tests, but a way to determine whether 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 non-exempt undergraduates prior to placement in appropriate university English coursework. Exemptions from the test are given only to 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 (taken prior to October 1989);
- a score of 25 or above on the enhanced ACT English Test (taken October 1989 or later);
- a score of 600 or above on the College Board Achievement Test in English Composition with essay;
- for transfer students, completion and transfer to the CSU of an acceptable college course in English composition of four quarter units or three semester units with a grade of C or better.

Failure to take the English Placement Test, as required, before the end of the second quarter of enrollment 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.

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 succeed in college-level work.

* Undergraduates admitted with 56 or more transferable semester units and who are subject to a campus catalog or bulletin earlier than 1986–87 are not required to complete the EPT.

Cal Poly students may not enroll in ENGL 114 Writing: Exposition without taking the EPT or qualifying for an exemption from it.

Information bulletins and registration materials for the EPT will be mailed to all students subject to the requirements. The materials also may be obtained from the Test Office or the Writing Skills Program Office.

ENTRY LEVEL MATHEMATICS (ELM) EXAM

The ELM examination tests for entry level mathematics skills acquired through three years of rigorous college preparatory mathematics coursework (normally Algebra I, Algebra II, and Geometry). All new undergraduate students must take the test or be exempted from it prior to placement in appropriate university mathematics coursework. Specific policies regarding retesting and placement will be determined by the campus. 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 560 or above on the mathematics section of the Scholastic Aptitude Test (SAT-Math);
- a score of 24 or above on the American College Test (ACT) Mathematics Test (taken prior to October 1989);
- a score of 25 or above on the enhanced ACT Mathematics Test (taken October 1989 and later);
- a score of 560 or above on the College Board Mathematics Achievement Test, Level 1 or Level 2;
- for transfer students, completion and transfer to the CSU of a college course that satisfies the General Education-Breadth requirement or the Intersegmental General Education Transfer Curriculum requirement in Quantitative Reasoning, provided such course was completed with a grade of C or better.

Failure to take the ELM, as required, before the end of the second quarter of enrollment may lead to administrative probation, which, according to Section 41300.1 of Title 5 of the *California Code of Regulations*, and CSU Executive Order 393, may lead to disqualification from future attendance. Failure to satisfactorily complete the ELM requirement by the end of the first year will lead to administrative probation and possible disqualification from the university.

At Cal Poly, ELM examination scores are valid for a period of two years. Students who do not pass a baccalaureate level course within two years of passing the ELM examination are required to retake the ELM examination before enrolling in such a course. The results of the ELM test will not affect admissions eligibility.

Information bulletins and registration materials for the ELM will be mailed to all students subject to the requirements. The materials may be obtained from the Test Office, and the Mathematics Department.

CAL POLY MATHEMATICS PLACEMENT EXAMINATION

The Cal Poly Mathematics Placement Examination (MAPE) is a series of diagnostic examinations used by the Mathematics Department to place students in the appropriate mathematics course. The Pre-calculus MAPE measures competence in skills of math analysis and trigonometry. Students who have satisfied the ELM requirement and who anticipate taking either Finite Mathematics or Calculus (MATH 124, 131, 141 or 221) are expected to take the Pre-calculus MAPE during the two-quarter period preceding enrollment. Exemptions from the MAPE are given only to those students who have passed a prerequisite course at Cal Poly.

Questions regarding the MAPE may be directed to the Mathematics Department, 756-2208.

EVALUATION OF TRANSFER CREDIT

The Office of Academic Records will evaluate previous college work as it relates to the requirements at Cal Poly, SLO. Each student seeking a degree will be issued an Evaluation of Transfer Credit statement which will serve as a basis for determining the remaining requirements for the student's specific degree objective. Semester units transferred to the University will be converted to quarter units by multiplying the semester units by one and one-half.

Evaluation of Transfer Credit statements are completed automatically as students are admitted. It is important that new transfer students review their previous college work in terms of the degree and credential requirements outlined in the catalog to make a tentative selection of courses for their first quarter of enrollment. Students should consult a faculty advisor in their major department or the appropriate Advising Center for assistance in the selection of courses.

The evaluation remains valid as long as the student matriculates for the term specified, pursues the objective declared, and remains in continuous attendance.

While students may follow the specific catalog year academic requirements on which their Evaluation of Transfer Credit is based, they will be responsible for complying with changes in other regulations, policies, and procedures which may appear in subsequent catalogs.

Credit for Community College Courses

Course credit earned in accredited community colleges will be evaluated by the Office of Academic Records in accordance with the following provisions:

- (1) Community college credit is allowed up to a maximum of 105 quarter units (70 semester units). Credits and grades earned above the maximum allowable may be used only to satisfy subject and grade point requirements

but they may not be applied toward the total units required for graduation from the University.

- (2) No upper division credit may be allowed for community college work.

Cal Poly and California Community Colleges have written articulation agreements relative to the equivalency of courses; students planning to transfer to Cal Poly should consult their community college counselors if they have questions about transfer courses.

General Education-Breadth certifications will be accepted from California institutions from which the students transfer. The certification determines the completion of lower division General Education-Breadth Requirements. Students must still complete twelve upper division General Education and Breadth units and twelve General Education and Breadth units in residence for graduation.

OTHER ACADEMIC CREDIT

Advanced Placement

Cal Poly grants credit toward its undergraduate degrees for successful completion of Advanced Placement Program examinations of the College Board. Students who present scores of three or better will be granted up to six semester units (nine quarter units) of college credit.

Credit for Noncollegiate Instruction

Cal Poly 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 are those recommended in the Guide to the Evaluation of Educational Experience in the Armed Services and the National Guide to Educational Credit for Training Programs.

Credit for Military Service

Nine quarter units of elective credit will be allowed toward graduation to any student with an honorable discharge submitting evidence of satisfactory completion of one year of training in the military service of the United States. Credit is allowed in accordance with the recommendations by the Commission on Educational Credit and Credentials of the American Council on Education. The number of units allowed are those recommended in the *Guide to the Evaluation of Educational Experience in the Armed Services*.

Credit is not given for college level General Educational Development Tests. No grade points are assigned in connection with units of credit allowed for military service. The units allowed are not included in scholarship computations.

Credit by Examination

Cal Poly 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.

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 petition for credit by examination during the same quarter that the student is enrolled in the course.

A regularly enrolled student may petition for credit by examination in courses in which he or she is qualified through previous education or experience and for which credit has not otherwise been given. Such a request will not be considered for a course in which the student is enrolled, or for which a student has received a failing or "NC" grade at Cal Poly, or for which a student has previously unsuccessfully attempted credit by examination. A fee is charged for such an examination.

The examination 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. The grade received is entered on the student's permanent record. The grade may not be Credit/No Credit. The length of the examination will be consistent with the unit value of the course.

There are certain College Level Examination Program (CLEP) tests which are acceptable for credit when completed with an appropriate score. Information on which tests are acceptable, the amount of credit that will be given and how the credit will be applied for meeting degree requirements can be obtained from the Office of Academic Records.

Credit for CLEP and other externally developed examinations will not be awarded if any of the following apply:

- examination previously taken within the past year;
- equivalent degree credit or duplicate credit has already been granted;
- credit has been granted for previous coursework or for a previously completed more advanced or higher level examination;
- total amount of credit awarded for externally developed tests exceeds 45 quarter units (Advanced Placement Examination credit excluded from this limit).

Arrangements to obtain course credit by examinations may be made with the head of the department in which the course is taught. Units of credit received through this procedure do not apply toward the residence requirements for any of the degrees or credentials offered by the university. Detailed instruction for applying for credit by examination may be obtained from the Office of Academic Records.

STUDENT CLASSIFICATION

Undergraduate students are assigned classification level according to the number of quarter units earned:

Lower Division

Freshman fewer than 45 units
Sophomore..... 45 to 89 units

Upper Division

Junior 90 to 134 units
Senior..... 135 or more units

General Requirements – Bachelor's Degree

CHOICE OF CATALOG

Cal Poly issues a new catalog every two years, and the requirements for degree programs may change from one catalog to the next. Students have the right to choose the catalog they'll use, as described in Section 40401 of Title 5 of the *California Code of Regulations*.

An undergraduate student remaining in attendance in regular sessions at any California State University campus, at any California community college, or any combination of California community colleges and campuses of the 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 the campus, or
- (3) at the time of graduation.

Campus authorities may authorize or require substitutions for discontinued courses. A campus 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 university year. 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. (Title 5 of the *California Code of Regulations*, Section 40401.)

GENERAL GRADUATION REQUIREMENTS

There are eight general requirements which all students must meet in order to earn the bachelor's degree from Cal Poly. *Students must be formally admitted and must matriculate in order to earn a degree.* The more students understand their progress toward meeting these requirements and relate them to the many programs available, the better the chance of creating an exciting educational experience and avoiding errors which may delay graduation.

The specific requirements for each of the degree programs are listed under the academic department offering the major and include a curriculum display which lists major courses, support courses, general education and breadth courses and electives. The department may have a flow chart which shows in detail the recommended sequence of courses leading to your degree.

Students are responsible for meeting all requirements, although assistance is available from departmental faculty advisers, school advising centers, and the Evaluations Office.

Students should plan their degree programs carefully and review them frequently with their academic advisers. The basic graduation requirements are as follows:

1. Total Units

Bachelor of Arts	186 units
Bachelor of Science	186–198 units
Bachelor of Science (Engineering programs)	198–210 units
Bachelor of Architecture	248–263 units
Bachelor of Landscape Architecture	236 units

For the Bachelor of Arts, a minimum of 18 major units must be in upper division courses and 60 units overall must be upper division. For the Bachelor of Science degrees, a minimum of 27 major units must be in upper division courses and 60 units overall must be upper division.

2. Grade Point Average (GPA)

Students must earn at least a 2.0 GPA in all Higher Education units attempted (all college-level work), in Cal Poly cumulative units attempted, and in the major (the courses listed as major courses in the curriculum display). For a definition of GPA and quality points and hours, please refer to Grading.

3. U. S. Cultural Pluralism (USCP) Requirement

Students must complete the USCP requirement as indicated in the USCP section of this catalog (see page 76).

4. General Education and Breadth (GEB) Courses

Students must complete the GEB requirements as indicated in the degree program and shown in the GEB section of this catalog (see page 77).

5. Graduation Writing Requirement (GWR)

Students must demonstrate competency in writing skills as described below.

6. Senior Project

A senior project is a formal report of the results of a study or experiment selected and completed under faculty supervision with a minimum of 30 hours of student work required per unit of credit. Students must satisfactorily complete a senior project in order to receive any bachelor's degree.

7. Academic Residence Requirements

Students must earn no less than 50 quarter units in residence, and earn at least 30 of these units among the last 40 units counted toward the degree. Thirty-six of these units must be earned in upper division courses and 18 of the units must be in the major. (Title 5, Section

40403.) Extension credit or credit by examination may not be used to fulfill the residence requirement. However, a maximum of 36 quarter units of extension credit may be counted toward the bachelor's degree.

8. Evaluation for Graduation

Students should request a graduation evaluation from the Office of Academic Records approximately three quarters prior to their anticipated graduation date. The evaluation confirms remaining requirements for graduation and is a formal statement on the expected quarter of graduation. The actual date of graduation will be the end of the quarter in which all requirements have been met. Diplomas may be ordered through El Corral Bookstore, but the order will not be fulfilled until all degree requirements have been completed. The diploma will be mailed approximately four months after the degree has been awarded.

If a student breaks attendance prior to completion of degree requirements, he or she may be required to re-enroll and may be held to catalog requirements in effect at that time.

GRADUATION REQUIREMENT IN WRITING PROFICIENCY

All students must demonstrate competency in writing skills as a requirement for graduation. Information on currently available ways to meet this graduation requirement may be obtained from the Writing Skills Program Office, Agriculture Building (10), Room 130, 756-2067.

The Board of Trustees of The California State University has mandated that all students earning undergraduate or graduate degrees in the CSU must be certified as proficient in writing at the upper-division level. At Cal Poly students may meet the Graduation Writing Requirement (GWR) through one of three options:

1. Pass the Writing Proficiency Exam.
2. Pass an approved 300-level composition course with a grade of C or better AND receive certification of proficiency in writing from the instructor based on a 500-word in-class essay.
3. Pass an approved 300-level literature course with a grade of C or better AND receive certification of proficiency in writing from the instructor based on a 500-word in-class essay.

The 300-level courses approved for GWR credit are listed in the *Class Schedule* under Graduation Writing Requirement.

Students must earn proficiency after reaching 90 units. Each student should review his or her curricular requirements to determine which option is appropriate. The GWR must be fulfilled at Cal Poly, not at another campus.

OTHER INFORMATION

CURRICULUM SUBSTITUTION

Although a curriculum is specified for each major, under certain conditions a student may be permitted some deviation from the established curriculum. Substitutions involving General Education and Breadth courses must be approved through the department offering the GEB course. Forms are available at the Office of Academic Records. See the major department office for substitutions involving major or support courses.

CHANGE OF MAJOR

Students who feel they have selected an inappropriate major for their interests and abilities should contact their adviser and a Counselor at Career Services (756-2501) for advice and assistance in making curriculum changes. Students should contact the prospective major department for preliminary information regarding changing majors; requirements vary depending on major. Admission to a new curriculum will depend on the availability of space within the limitations imposed by budget, faculty, and facilities. Once approved, students will automatically receive a re-evaluation of completed requirements for the new major from the Office of Academic Records.

Transfer from one curriculum to another does not in any way change a student's scholastic standing.

DOUBLE MAJORS

The student will normally meet graduation requirements for a degree in one of the major curricula.

A student may be granted a bachelor's degree with two majors if the complete requirements of both major curricula are satisfied at the same time.

However, no more than one diploma or degree will be granted to the same student at one commencement. In the event that a student has completed the requirements for two different degrees, such as a B.A. and a B.S., the student will be required to declare one major as the degree major in order to determine which degree will be awarded. The fact that the requirements of another program have been completed will be noted on the transcript.

A student who desires to submit only one senior project covering two graduation majors must file a petition for special consideration prior to the date of commencing the senior project.

SECOND BACHELOR'S DEGREE

A qualified student who holds a bachelor's degree from Cal Poly or from another accredited institution may be awarded a second bachelor's degree in a different major. Students must complete General Education and Breadth requirements in effect at the time of admission to the additional baccalaureate degree program and all of the courses for the new degree as specified by the department. A minimum of 45 units of coursework for Cal Poly graduates and 50 units for graduates from another accredited institution must be completed in

residence after the requirements for the first degree have been fulfilled. A senior project is required for each bachelor's degree.

GRADUATE CREDIT TAKEN BY UNDERGRADUATES

Undergraduates are not permitted to take courses in the 400 or 500 series for graduate credit until they are within 12 quarter units of graduation. Such students may petition for up to 9 units of graduate credit when the courses are not required for the baccalaureate degree and must petition for the credit prior to completion of the coursework. Students should verify the applicability of such credit toward their graduate objective.

Candidates for professional clear credentials (except Agricultural Education) may *not* use courses taken as an undergraduate in a planned 45-unit program.

HONORS

The **Dean's Honors List** is compiled at the end of each quarter to honor undergraduate students who have completed 12 or more letter-graded units during the quarter with a 3.5 grade point average or better for that term. The **President's Honors List** is compiled at the end of each university year to honor those undergraduate students who have demonstrated consistent achievement, as represented by being named to the Dean's Honors List for any three of the four quarters of the university year. The university year begins with summer quarter.

Candidates for bachelor's degrees with Cal Poly grade point averages indicated below will be awarded honors at graduation. The GPA is officially calculated at the time the student has *completed* graduation requirements.

The three honors categories are as follows:

- Summa cum laude – 3.85
- Magna cum laude – 3.70
- Cum laude – 3.50

MINORS

A minor is an integrated, coherent group of courses (24 to 30 quarter units) which gives the student knowledge in an area which lies outside of the major field of study. At least half of the units must be from upper-division courses (300- or 400-level) and at least half of the units must be taken at Cal Poly.

Not more than one-third of the courses in a minor can be graded Credit/No Credit (CR/NC), except for courses which have mandatory CR/NC grading. A minimum 2.0 GPA is required in all units counted for completion of the minor (foreign language minors must have a 2.75 GPA). A minor is not required for a degree.

The minor will be completed along with the requirements for the bachelor's degree. Courses in the minor may not be counted toward the major, but may be used to satisfy support

and general education requirements. Selection of a major and a minor from the same discipline is not permitted.

Students who wish to complete a minor are to contact the department offering the academic minor as early as possible in the program and fill out the appropriate agreement form. The minor is declared when the student requests a graduation evaluation in the Evaluations Office. The completion of the minor will be noted on the student's transcript but will not be shown on the diploma. In no case will a diploma be awarded for the minor.

Information regarding course requirements may be found in this catalog under the listing for the department or college offering the minor.

Minors	Department/College
Agribusiness.....	Agribusiness
Anthropology/Geography	Social Sciences
Art.....	Art and Design
Biotechnology	Science and Mathematics
Business.....	Business
Computer Science.....	Computer Science
Dance.....	Theatre and Dance
Economics.....	Economics
English.....	English
Ethnic Studies.....	Ethnic Studies
Food Science	Food Science and Nutrition
French	Foreign Languages & Literatures
German.....	Foreign Languages & Literatures
Gerontology.....	Psychology and Human Development
Graphic Communication	Graphic Communication
History.....	History
Integrative Technology.....	Industrial Technology
International Relations	Political Science
Linguistics	English
Mathematics	Mathematics
Music	Music
Nutritional Science.....	Food Science and Nutrition
Packaging.....	Industrial Technology
Philosophy	Philosophy
Plant Protection	Crop Science
Poultry Management	Animal Science
Psychology.....	Psychology and Human Development
Public Administration	Political Science
Spanish	Foreign Languages & Literatures
Speech Communication	Speech Communication
Statistics	Statistics
Theatre	Theatre and Dance
Values, Technology and Society.....	Liberal Arts
Water Science.....	Agriculture
Women's Studies	Liberal Arts

COMMENCEMENT

Students completing all degree requirements in the Winter, Spring or Summer term are eligible to participate in the Spring Commencement. Students completing degree requirements in the Fall term are eligible for Fall commencement.

U.S. Cultural Pluralism Requirement

U.S. Cultural Pluralism (USCP) courses fulfill the following criteria:

1. Emphasis on one or more of these four U.S. Cultures:
Asian American, African American, Hispanic American, American Indian;
2. Attention to general issues of gender, diversity, equity, ethnocentricity, and ethnicity; and the relationships to problems facing contemporary society, especially those resulting from racism, discrimination and cultural conflict;
3. Application of rigorous pedagogical, scholarly methods and standards as evidenced in substantive exams, reports, papers, and projects; and
4. Attention to critical thinking skills which will allow students to address cultural, racial, and gender issues in a sensitive and responsible manner and to evaluate their own attitudes and those of others.

Students are required to complete *one* USCP course. This course will also fulfill a requirement for Major, Support, General Education and Breadth (GEB), or Free Elective category.

The following courses fulfill the U.S. Cultural Pluralism requirement. Additional courses are under consideration and students should consult the current *Class Schedule* or their academic adviser for an up-to-date list.

AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (4)
 ENGL 345 Women Writers (4) (GEB C.3.)
 ENGL 346 Ethnic American Literature (4) (GEB C.3.)
 ES 114 Racism in American Culture
 ES 210 U.S. Cultural Heritage
 ES 230 Chicano/a Literature
 ES 320 American Cultural Images
 ES 325 African American Women's Experiences
 HIST 325 Comparative History of American Minorities (3)
 HIST 328 American Indian History (3)
 HIST 329 American Indian Thought (3)
 HIST 331 Afro-American History (3)
 HIST 435 American Women's History since 1870 (3)
 JOUR 290 Multicultural Journalism (3)
 PHIL 335 Social Ethics (3) (GEB C3)
 POLS 303 Minority Group Politics (3)
 POLS 323 Civil Rights in America (4)
 SOC 316 American Ethnic Minorities (3)
 SPAN 340 Chicano/a Authors (4) (GEB C3)
 WS 301 Introduction to Women's Studies (3)

General Education and Breadth Requirements

General Education and Breadth (GEB) requirements in the CSU are so designed that, taken with the major depth program and elective units presented by the candidate for the bachelor's degree, they will assure that graduates from the several campuses in the system have made noteworthy progress toward becoming truly educated persons. Particularly, the purpose of the breadth requirements is to provide means whereby graduates:

- will have achieved the ability to think clearly and logically, to find and critically examine information, to communicate orally and in writing, and to perform quantitative functions;
- will have acquired appreciable knowledge about their own bodies and minds, about how human society has developed and how it functions, about the physical world in which they live, about the other forms with which they share that world, and about the endeavors and legacies of their civilizations; and
- will have come to an understanding of the principles, methodologies, value systems, and thought processes employed in human inquiries.

General Education at Cal Poly is so designed that, in addition to the objectives mentioned, graduates will have also achieved at least a rudimentary knowledge and understanding of technology.

At least 12 units of GEB shall be earned at the campus granting the degree.

At least 12 units of General Education and Breadth courses must be at the 300–400 level.

All the requirements which follow are to be governed by the following general regulation:

Except where expressly prohibited, courses taken to satisfy General Education and Breadth requirements may also simultaneously satisfy requirements in any other portion of the student's curriculum.

Students should consult departmental advisers and curriculum displays in this catalog for specific courses which may be required in the degree program.

In addition to the courses identified below, the current quarterly *Class Schedule* includes the most up-to-date listing of approved GEB courses.

DISTRIBUTION AREA A

A minimum of 14 quarter units in communication in the English language, to include both oral communication and written communication, and in critical thinking, to include consideration of common fallacies in reasoning.

All students must complete ENGL 114 before taking Critical Thinking. Expository Writing and Critical Thinking must be completed before taking SPC 201 or SPC 202 or ENGL 215 or ENGL 218.

- | | |
|--|-----------------|
| 1. ENGL 114 Writing: Exposition (4) | GEB A.1. |
| 2. Select one: ENGL 125 Critical Thinking (3)
PHIL 125 Critical Thinking (3)
SPC 125 Critical Thinking (3) | GEB A.2. |
| 3. Select one: SPC 201 Public Speaking (3)
SPC 202 Principles of Speech Communication (3) | GEB A.3. |
| 4. Select one: ENGL 215 Writing: Argumentation (4)
ENGL 218 Professional Writing: Argumentation and Reports (4) | GEB A.4. |

DISTRIBUTION AREA B

A minimum of 18 quarter units to include inquiry into the physical universe and its life forms, with some immediate participation in laboratory activity, and into mathematical concepts and quantitative reasoning and their applications.

1. Physical and Life Sciences **GEB B.1.**

All students must complete a minimum of nine units from the approved list of courses in physical and life sciences, at least one course in each. At least one of the courses selected must include a laboratory.

(a) Physical Sciences **GEB B.1.a.**

Courses may be selected as follows:

ASTR Any lower division course

CHEM Any lower division course except 106, 200, 252, 253

GEOL Any lower division course except 211. GEOL 206 can be selected if GEOL 201 or 204 have been completed.

PHYS Any lower division course except 100, 137, 200, 202, 206, 207, 256, 257

PSC Any lower division course (only PSC 101 has a lab). A student using PSC 205 for GEB credit also must take at least one other course in area B.1.a.

Any 300-level physical science course (having one of the prefixes ASTR, CHEM, GEOL, PHYS or PSC prefix) and having one of the above as a prerequisite may also be selected with the exception of CHEM 350, PHYS 357, PHYS 363.

(b) Life Sciences**GEB B.1.b.**

Courses may be selected as follows:

BACT Any lower division course

BIO Any lower division course except 100 and 253.

A student using BIO 205 for GEB credit also must take at least one other course in area B.1.b.

BOT Any lower division course except 238

ZOO Any lower division course except 237

Any 300-level life science course (having one of the prefixes BACT, BIO, BOT or ZOO prefix) and having one of the above as a prerequisite may also be selected with the exception of BIO 321, 322, 323, 324, 342.

2. Mathematics and Statistics**GEB B.2.**

All students must complete a minimum of two courses in mathematics and statistics, at least one of which must be mathematics.

(a) Mathematics

Courses may be selected as follows:

MATH 112 The Nature of Modern Mathematics (3)

MATH 117 Pre-Calculus Algebra II (3) *Note: MATH 116 is a prerequisite for MATH 117; MATH 116 and MATH 117 are equivalent to MATH 118 but are taught at a slower pace for those who need more review. MATH 117 satisfies GEB B.2.*

MATH 118 Pre-Calculus Algebra (4)

MATH 119 Pre-Calculus Trigonometry (3)

MATH 120 Pre-Calculus Algebra & Trigonometry (5)

MATH 124 Finite Mathematics (3)

MATH 131 Technical Calculus (4)

MATH 141 Calculus I (4)

MATH 221 Calculus for Business and Economics (4)

MATH 328 Introduction to Mathematics (4)

Any 100, 200, or 300 level MATH courses having one of the above as a prerequisite may also be chosen with the exception of MATH 300 and MATH 327.

(b) Statistics

Courses may be selected as follows:

STAT 130 Introduction to Statistical Reasoning (3)

STAT 211 Elementary Probability and Statistics (3)

STAT 217 Statistical Methods (4)

STAT 251 Statistical Inference for Management I (4)

STAT 321 Statistical Analysis I (4)

Any 200 or 300 level STAT courses having one of the above as a prerequisite may also be chosen with the exception of STAT 200 and STAT 330.

DISTRIBUTION AREA C

A minimum of 18 quarter units among the arts and humanities, at least 3 units of which must be at the 300–400 level (Area C.3.).

1. Critical Reading**GEB C.1.**

To increase students' experience in expository writing, GEB C.1. English courses have a composition component of 2500 words. A minimum of three lower division courses in literature and philosophy, at least one course in each, selected from the following:

ENGL 230 Masterworks of British Literature:
Through the Eighteenth Century (4)

ENGL 231 Masterworks of British Literature:
Romantic Period to the Present (4)

ENGL 240 American Tradition in Literature (4)

ENGL 251 Great Books of World Literature:
Classical and Ancient World (3)

ENGL 252 Great Books of World Literature:
Middle Ages, Renaissance and Enlightenment (3)

ENGL 253 Great Books of World Literature:
Romanticism and the Modern World (3)

FR 233 Critical Reading in French Literature (4)

GER 233 Critical Reading in German Literature (4)

PHIL 230 Philosophical Classics (3)

PHIL 231 Philosophical Classics (3)

SPAN 233 Critical Reading in Hispanic Literature (4)

2. Fine and Performing Arts**GEB C.2.**

A minimum of one lower division course selected from the following:

ART 101 Fundamentals of Drawing (4)

ART 108 Fundamentals of Sculpture (4)

ART 111 Introduction to Art (4)

ART 112 Survey of Art History (3)

DANC 221 Dance Appreciation (3)

MU 101 Introduction to Music Theory I (3)

MU 120 Music Appreciation (4)

TH 210 Introduction to Theatre (3)

3. Electives in Literature, Philosophy, and the Arts**GEB C.3.**

Select a minimum of one 300–400 level course from the following list. *Courses offered by the student's major department cannot be counted in the elective portion of Distribution Area C.*

ARCH 316 California Architecture and the California Dream (3)

ARCH 317 History of Architecture (3)

ARCH 318 History of Architecture (3)

ARCH 319 History of Architecture (3)

ART 312 Art History—Contemporary Art (4)

ART 314 History of Photography (4)

DANC 321 Dance History (3)

ENGL 330 British Literature: Medieval Period (4)

ENGL 331 British Literature: The Renaissance (4)

ENGL 332 British Literature: The Enlightenment (4)

ENGL 333 British Literature: Romanticism (4)

ENGL 334 British Literature: The Victorians (4)
 ENGL 335 British Literature: 20th Century (4)
 ENGL 338 Shakespeare in London (4)
 ENGL 339 Introduction to Shakespeare (3)
 ENGL 340 American Literature to 1860 (4)
 ENGL 341 American Literature: 1860-1914 (4)
 ENGL 342 American Literature: 1914 to the Present (4)
 ENGL 345 Women Writers (4)
 ENGL 346 Ethnic American Literature (4)
 ENGL 350 Modern Novel (3)
 ENGL 351 Modern Poetry (3)
 ENGL 352 Modern Drama (3)
 ENGL 353 Modern Drama in London (4)
 ENGL 370 World Cinema (4)
 ENGL 372 Film Directors (4)
 ENGL 380 Contemporary Literary Ideas (4)
 FR 305 Significant Writers in French (4)
 FR 405 French Literature in English Translation (4)
 GER 305 Significant Writers in German (4)
 GER 405 German Literature in English Translation (4)
 HUM 302 Human Values in Agriculture (3)
 HUM 310 Humanities in World Cultures (3)
 HUM 361 Modernism (4)
 HUM 362 Postmodernism (4)
 HUM 402 Values and Technology (3)
 MU 221 Jazz Styles (3)
 MU 324 Music and Society (3)
 PHIL 311 Greek Philosophy (3)
 PHIL 312 Medieval Philosophy (3)
 PHIL 313 Continental Philosophy: Montaigne to Leibniz (3)
 PHIL 314 British Philosophy: Bacon to Mill (3)
 PHIL 315 German Philosophy: Kant to Nietzsche (3)
 PHIL 316 Contemporary European Philosophy (3)
 PHIL 317 Contemporary British and American Philosophy (3)
 PHIL 321 Philosophy of Science (3)
 PHIL 331 Ethics (3)
 PHIL 332 History of Ethics (3)
 PHIL 333 Political Philosophy (3)
 PHIL 334 Jurisprudence (3)
 PHIL 335 Social Ethics (3)
 PHIL 337 Professional Ethics (3)
 PHIL 339 Biomedical Ethics (3)
 PHIL 340 Environmental Ethics (3)
 PHIL 342 Philosophy of Religion (3)
 PHIL 351 Traditional Theories of Aesthetics (3)
 PHIL 352 Contemporary Theories of Aesthetics (3)
 PHIL 411 Metaphysics (3)
 POLS 334 Jurisprudence (3)
 RELS 304 Judaism (3)
 RELS 305 Christian Origins (3)
 RELS 306 Hinduism (3)
 RELS 307 Buddhism (3)
 RELS 308 Islam (3)
 SPAN 305 Significant Writers in Spanish (4)
 SPAN 340 Chicano/a Authors (4)
 SPAN 405 Hispanic Literature in English Translation (4)
 SPC 330 Classical Rhetorical Theory (4)
 TH 327 Theatre History and Literature (3)
 TH 328 Theatre History and Literature (3)

DISTRIBUTION AREA D

A minimum of 18 quarter units dealing with human social, political, and economic institutions and behavior and their historical background.

1. *Title 5, Section 40404 Requirements:* **GEB D.1.**
 HIST 204 The History of American Ideals and Institutions (3)
 POLS 210 American and California Government (3)
2. HIST 315 Modern World History (3) **GEB D.2.**
3. Select at least *one* course: **GEB D.3.**
 ECON 201 Survey of Economics (3)
 ECON 211 Principles of Economics (3)
 ECON 222 Macroeconomics (4)
4. Select at least *one* course from each group:
Group a: **GEB D.4.a.**
 ANT 201 Cultural Anthropology (3)
 GEOG 150 Human Geography (3)
 SOC 105 Introduction to Sociology (3)
Group b: **GEB D.4.b.**
 Courses offered by the student's major department cannot be counted as satisfying the requirements of this group.
 ANT 360 Human Cultural Adaptation (3)
 BUS 404 Governmental and Social Influences on Business (4)
 ECON 304 Comparative Economic Systems (3)
 ECON 325 Underdevelopment and Economic Growth (3)
 GEOG 308 Global Geography (3)
 POLS 370 Contemporary Global Political Issues (3)
 POLS 371 World Food Politics (3)
 SOC 309 The World System and Its Problems (3)
 SOC 315 Race and Ethnic Relations (3)
 WS 411 Women, Race and Class (3)

DISTRIBUTION AREA E

A minimum of 5 quarter units in study designed to equip human beings for lifelong understanding and development of themselves as integrated physiological, social, and psychological entities. Students selecting BIO 220 may count 2 units in Area B and 2 units in Area E.

1. Select *one*: PSY 201 General Psychology (3) **GEB E.1.**
 PSY 202 General Psychology (3)
2. Select *one*: BIO 220 Physiology and Biological Adaptation (4) **GEB E.2.**
 FSN 210 Nutrition (3)
 PE 250 Health Education (2)
 PSY 304 Physiological Psychology (3)
 REC 100 Leisure Education and Lifestyle Management (2)

DISTRIBUTION AREA F

A minimum of 6 quarter units in courses designed to acquaint students with an awareness of how technology influences and is influenced by today's world.

1. Computer Literacy **GEB F.1.**
Select at least *one* course from the following:

AG 250 Computer Application to Agriculture (3)
 ARCH 250 Computer Applications (3)
 CSC 110 Computers and Computer Applications: MS-DOS (3)
 CSC 111 Introduction to Computer Applications for the Sciences (3)
 CSC 113 Computers and Computer Applications: Macintosh (3)
 CSC 118 Fundamentals of Computer Science I (4)
 CSC 120 Principles of Data Processing (4)
 CSC 204 C and UNIX (3)
 CSC 251 Digital Computer Applications (2)
 GRC 277 Computer Applications in Desktop Publishing (3)

2. Select at least *one* course from the following: **GEB F.2.**

AE 121 Agricultural Mechanics (2)
 AE 340 Irrigation Water Management (3)
 AERO 210 History of Aviation (3)
 AG 301 Agriculture and American Life (3)
 ARCH 312 Home and Community Design (3)
 CE 221 Fundamentals of Transportation Engineering (4)
 CRP 211 Introduction to Urbanization (3)
 CRP 212 Introduction to Urban Planning (3)
 CRSC 230 Agronomic Crop Production (4)
 CSC 302 Computers and Society (3)
 DSCI 230 General Dairy Husbandry (4)
 ENGR 301 Technology in the 20th Century (3)
 ENVE 324 Introduction to Air Pollution (3)
 ENVE 330 Environmental Quality Control (3)
 FNR 101 Natural Resources Management and Society (3)
 FNR 201 Forest Resources (3)
 FNR 202 Environmental Management (3)
 FRSC 230 California Fruit Growing (4)
 IME 319 Human Factors Engineering (3)
 IT 125 Industrial Wood Processes (3)
 IT 141 Plastics Processes and Applications (1)
 IT 301 Current Technological Issues (3)
 LA 201 Survey of Landscape Architecture (2)
 LA 311 History of Landscape Architecture (3)
 LA 321 Concepts in Environmental Decision Making (3)
 ME 221 Solar Energy (3)
 OH 230 Ornamental Gardening (3)
 SS 121 Introductory Soils (4)
 VGSC 230 Introduction to Vegetable Science (4)

Students in the Colleges of Agriculture, Architecture and Environmental Design, and Engineering and the Department of Industrial Technology are exempt from the requirements of this section (F.2). They may apply a maximum of 3 units from their major toward the satisfaction of the 12-unit upper division General Education requirement.

Registration

CAPTURE REGISTRATION

All students are required to enroll in courses by using the telephone voice response system named CAPTURE. The courses selected should meet the requirements specified for each student's major course of study.

Information concerning registration for classes and payment of fees is published in the *Class Schedule* which is on sale prior to the start of each term. Students should consult the *Class Schedule* for detailed registration procedures.

Credit for coursework completed is given only when the student is properly registered. A student is not properly registered until fees have been paid and enrollment in classes through the CAPTURE system has been confirmed. Individuals are not permitted to attend courses unless they are officially registered as regular students, as approved extension students, or as enrolled auditors (see Audit).

CLASS ATTENDANCE

Students are expected to be regular in attendance to keep the quality and quantity of work high. Absence from classes is regarded as serious, and work missed is not excused.

An excused absence can be allowed only by the instructor in charge of the class upon consideration of the evidence justifying the absence presented by the student. An excused absence merely gives the individual who missed the class an opportunity to make up the work and is not an excuse from the work required.

HOLDING OF RECORDS

Student records may be placed on a "Hold" status because of financial or other obligations to the university. The Hold authorizes the university to deny registration, prevent the release of transcripts, and to withhold other services normally provided to the student. The student's records will be held until the obligation is cleared to the satisfaction of the office or department placing the Hold.

ENROLLMENT STATUS

Full-time undergraduate students are those enrolled in 12 or more units of coursework in any regular quarter. Half-time undergraduate students are those enrolled in 6 to 11 units, and part-time undergraduate students are those enrolled for less than 6 units. Verification of enrolled units is based on enrollment status at the time of the verification request. Full-time status for graduate students is defined in the "Graduate Studies" section of this catalog.

MAXIMUM UNIT LOAD

The maximum load for undergraduate students is 20 quarter units including audited courses and concurrent work at other colleges. Maximum load for graduate students is 16 units per quarter. Exceptions may be made with the advance approval of the student's major department head. A petition to carry an

excess load is available from the Office of Academic Records. Maximum load requirements may be waived only on presentation of evidence of ability to carry successfully such a group of courses.

ADD/DROP

Following registration, all changes to individual class enrollments become the responsibility of the student. The add/drop (change of program) period begins after the CAPTURE initial registration cycle has concluded and ends after the first two weeks of instruction of each term. During this period, the student has the opportunity to add new classes or voluntarily drop from existing classes. Specific dates for completing these transactions are published in the quarterly *Class Schedule*.

Adding

First class meeting: Students who add a class after the first class meeting must obtain the instructor's permission to remain in the class.

Time conflict: Students may not enroll in two classes which meet at the same time.

Eligibility: Students must meet prerequisite and Class Schedule footnote requirements and be in attendance at the first class meeting to remain enrolled in the class.

Late registration: Students registering late have until the end of the add/drop period to pay late registration fees and to register for classes through CAPTURE.

Dropping

Students have until the end of the second week of instruction to drop a class through CAPTURE and no entry will be made on their academic records. At the end of the regular add/drop period the instructor must assume that any student who has not dropped voluntarily remains officially enrolled in the class. For program changes after the end of the regular add/drop period see Withdrawals from Courses.

First class meeting: An instructor may drop a student from a class for failure to attend the first class meeting.

Footnote requirement: An instructor may drop a student from a class if the footnote requirements, as stated in the Class Schedule, are not met.

Prerequisite missing: An instructor may drop a student from a class if the prerequisite requirements, as stated in the catalog course description, have not been completed.

Canceled classes: If a class is canceled, students will be automatically dropped and have no reporting responsibilities.

LEAVES OF ABSENCE

Students are permitted to take a Planned Educational Leave or a Medical Leave and be absent for up to two calendar years. A written request by the student and approval by

campus officials are required. The general guidelines for determining eligibility and approving requests for leaves of absences are listed below.

1. A Planned Educational Leave must be for a purpose which contributes to the student's educational objective and is approved by the student's major department head or chair.
2. A Medical Leave provides time for the student to receive treatment or to recover from a disabling injury or other medical condition and is approved by either the campus' Director of Health and Psychological Services or Disabled Student Services.
3. To be considered for an Educational Leave, the student must be eligible to enroll for the term in which the leave begins and not be on academic probation.
4. The application for Educational Leave must be initiated and approved before the leave begins and will not be granted retroactively; the Medical Leave begins the term following the student's last term in attendance and may be granted retroactively based on the student's personal situation.
5. A student on Educational or Medical Leave will be considered to be in continuous attendance with the purpose of returning to the same curriculum which was in effect when the leave began.
6. A student on Educational or Medical Leave will not be required to apply for readmission or pay an application fee provided that the student returns to the same major and within the time period agreed upon when the application was approved.
7. The student on leave may return and enroll for any term prior to the term when the leave is scheduled to end. Neither leave will be extended beyond the two-year limitation for any reason.
8. Any student on leave who fails to return and enroll within the time limits specified by the leave agreement will be required to reapply for admission, pay the reapplication fee, and may be held to any new curriculum requirements which may be in effect.
9. Students are eligible to obtain two Educational Leaves during their career at Cal Poly including graduate school.

Application forms and information concerning Leaves of Absence may be obtained from the Registrar's Office.

RETURNING STUDENTS

Matriculated students who have not registered for three consecutive quarters and who have not been on an approved leave of absence must file an application for readmission. The application fee must accompany the application for readmission. See the Admissions section for application deadlines for returning students.

Matriculated students who have not registered for one quarter or two consecutive quarters need not apply for readmission. Summer Quarter is a regular quarter and is counted in determining the length of absence.

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 admission 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. These groups include:

- Students who live in campus residence halls;
- Students who obtained primary or secondary schooling outside the United States;
- Students enrolled in dietetics, medical technology, student teaching, or field work in a health care setting or involving preschool-age children; and
- Intercollegiate Athletes.

Registration will not be permitted until this requirement has been satisfied. Contact the Student Health Center for information concerning clearances or immunizations.

Grading and Academic Standards

GRADING

A grade may be changed for the purpose of correcting clerical or administrative error, or to correct an error in the calculation or recording of a grade. A change of grade shall not occur as a result of additional work performed or re-examination beyond the established course requirements.

Quality Hours carry grade point value.

Quality Points are awarded for each course unit and are determined by multiplying course unit by the point value of the grade.

Grade Point Average (GPA) is determined by dividing Quality Points by Quality Hours.

Higher Education GPA is the grade point average of all college level work.

Transcripts are the official record of academic history. Once a degree has been posted, subsequent revision and alteration of any transcript entry is permitted only for correction of proven error as certified by the appropriate academic dean and the Registrar.

GRADING SYMBOLS

Academic Grading Symbols Earned		Quality Points Earned
A	Superior Attainment of Course Objectives	4.0
A -	Superior Attainment of Course Objectives	3.7
B +	Good Attainment of Course Objectives	3.3
B	Good Attainment of Course Objectives	3.0
B -	Good Attainment of Course Objectives	2.7
C +	Acceptable Attainment of Course Objectives	2.3
C	Acceptable Attainment of Course Objectives	2.0
C -	Acceptable Attainment of Course Objectives	1.7
*D +	Poor Attainment of Course Objectives	1.3
D	Poor Attainment of Course Objectives	1.0
D -	Poor Attainment of Course Objectives	0.7
F	Non-Attainment of Course Objectives	0.0
CR	Credit	—
NC	No Credit	—
Administrative Grading Symbols		
AU	Audit	—
I	Incomplete (authorized)	—
U	Incomplete (unauthorized)	0
SP	Satisfactory Progress	—
RD	Report Delayed	—
W	Withdrew	—

* If a grade of D+ is received in a course which is a prerequisite for another course, the student is encouraged to repeat the prerequisite course before attempting the next course in sequence.

CREDIT/NO CREDIT GRADING

Some courses, as indicated in their catalog descriptions, are offered on a Credit/No Credit grading basis only.

The following conditions apply when a student elects to take for Credit/No Credit grading those courses which are not designated by the university as being graded on an exclusive Credit/No Credit basis.

- Up to 2 courses (not to exceed 8 units) or one intensive language course (12-15 units) may be taken per student per quarter on a Credit/No Credit grading basis; a maximum total of 15 courses (not to exceed 45 units) may be elected per student for Credit/No Credit grading.
- Students desiring to elect a course on a Credit/No Credit grading basis must be currently enrolled in the course and must elect the Credit/No Credit grading option at the time of registration. This request can be made through the third week of the quarter. Students may not change from one grading system to the other after the end of the third week.
- Undergraduate students will be given a grade of CR for accomplishment equivalent to a grade of C - or better. No credit will be given for D+ or lower grades. Graduate students will receive a grade of CR which is based on an evaluated grade of B - or higher and NC for assigned grades of C+ or lower. Instructors will submit conventional letter grades to the Registrar's Office where they will be converted to Credit/No Credit grades.
- Major or support courses in the student's curriculum may not be elected for Credit/No Credit grading.
- The applicant for a Credit/No Credit grade must have at least a 2.0 grade point average in cumulative Cal Poly work. This requirement is waived for first-time students.
- Units earned in courses for which the grade was CR will count toward satisfaction of all degree requirements.
- Grades of CR or NC are not included in calculating grade point averages.
- Nonmatriculated students in the Extension Program, Summer Session, and Workshops must meet the same requirements as matriculated students to elect courses on a Credit/No Credit grading basis. (The 2.0 GPA requirement is waived in the case of nonmatriculated students having no previous coursework recorded at Cal Poly.)

ADMINISTRATIVE GRADING SYMBOLS

Audit

A grade of AU indicates that a student was officially enrolled in class, participated in class, but was not required to be examined on course materials. Enrollment as an Auditor is

subject to the permission of the instructor. Procedures for auditing courses are published in the quarterly *Class Schedule*.

An auditor is a student who is attending courses for no credit. The student must be registered with fees paid for the quarter in which the course is to be audited. A student may enroll to audit a course during the add/drop period and no later than the last day to add a course. A student may change from credit to audit not later than the last day to drop a course. Courses enrolled for audit grades are not considered when determining enrollment status.

In cases where class sections must be limited in enrollment, preference will be given to students enrolling for credit. Students may not enroll for audit classes through CAPTURE.

The student services fee and nonresident tuition fee are determined on the basis of the total units for which the student is enrolled including courses audited.

Incomplete (Authorized)

An incomplete signifies that a portion of required coursework has not been completed and evaluated in the prescribed time period due to fully justified reasons and that there is still a possibility of earning credit. It is the student's responsibility to bring pertinent information to the instructor who will determine the means by which the remaining course requirements will be satisfied. A final grade is assigned when the work agreed upon has been completed and evaluated. The student is not permitted to reenroll in the course to complete course requirements. If the student does reenroll, the original grade of I will be counted as an F (or NC) and the reenrollment will be processed as a repeated course.

A grade of I must be made up within one calendar year immediately following the end of the term in which it was assigned. An instructor may specify a time limitation of less than one year. This limitation prevails whether or not the student maintains continuous enrollment. Failure to complete the assigned work will result in the I being counted as equivalent to an F (or NC) for grade point average computation. All remaining grades of I will be changed to F (or NC) at the time the student's degree is awarded.

Incomplete (Unauthorized)

A grade of U indicates that a student enrolled for a course did not withdraw from the course and 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 computation this symbol is equivalent to an F.

Satisfactory Progress

The grade of SP is used in connection with courses that extend beyond one academic term. It indicates that work is in progress and has been evaluated and found to be satisfactory to date, but that assignment of a grade must await completion of additional work. Reenrollment is permitted

prior to the assignment of the final grade provided that the total permissible number of units for the course or courses is not exceeded. Work is to be completed within a stipulated time period. The SP symbol shall be replaced with the appropriate final grade within one year except for graduate degree theses for which the time may be up to two years, but may not exceed the overall time limit for completion of all master's degree requirements. Failure to complete the assigned work will result in an SP being counted as equivalent to an F for grade point average computation. Any extension of time limit must receive prior authorization by the dean of the school in which the student is a degree candidate. All remaining SP grade symbols will be changed to F or NC at the time the student's degree is awarded.

REPEATING A COURSE

Students may enroll in a course more than once for improving the grade point average under the following conditions:

1. A course taken at Cal Poly or at another university or college in which a grade of D+ or less was received may be repeated here with the new grade recorded along with the prior grade. The grade earned by repeating the course will replace the quality points, quality hours, and earned hours which were previously earned.
2. The course may not be repeated for Credit/No Credit if the student has previously received a grade of D+ or less in that course. The course may be repeated for Credit/No Credit only if the student has previously received a grade of NC in that course. An original NC grade may be repeated for CR/NC or a letter grade, but not for improving grade point averages.
3. Undergraduate students may repeat up to 20 units for grade point average improvement. This adjustment will be made automatically at the end of the term in which the course is repeated. A repeat petition is required for the following reasons only:
 - the course was originally taken before Fall 1987
 - the course was originally taken at another institution
 - the course has changed prefix or number

For the situations listed above, the repeat petition must be turned into the Office of Academic Records by the end of the seventh week of the quarter in which the course is repeated.
4. Except where noted in the specific course description that the course may be repeated for credit, a student may not receive additional credit for any course in which a grade of C or higher, including CR has been received. If the student repeats a course in which a C+ or higher grade was earned, both grades will be calculated in the grade point average but the duplicate earned hours will not be counted toward the degree.

WITHDRAWALS / RENEWAL

Withdrawals from Courses

The W grading symbol indicates that the student was permitted to withdraw from the course after the regular add/drop (change of program) period with the approval of the instructor and appropriate campus officials. It carries no adverse connotation of quality of student performance and is not used in calculating grade point averages.

Between the end of the regular add/drop period and the last day of instruction a student must request permission to withdraw from a course by processing a petition which is available at the Office of Academic Records. The petition will be approved and withdrawal authorized only if there are serious and compelling reasons for withdrawal in the judgment of the instructor and department head.

After the end of the 7th week of instruction withdrawals are permitted only if the withdrawal is based on an emergency situation clearly beyond the control of the student. In such cases a final or incomplete grade may be assigned for courses in which sufficient work has been completed to permit an evaluation to be made. The student must request permission to withdraw as specified above, or request grade assignment, both of which are subject to approval by designated campus officials. Any student who fails to provide notification or who fails to obtain formal approval to withdraw will be subject to failing grades (U or F).

Withdrawal for the Term

A student is permitted to withdraw from all classes for the quarter upon request and without restriction or penalty until the end of the 7th week of instruction. After the 7th week and through the last day of instruction, withdrawals for the term must be approved by campus officials. Disapproved, unauthorized, or unofficial withdrawal will subject the student to failing grades in all classes (U or F).

The student or duly authorized representative of the student is required to initiate a request for an "Official Withdrawal" with the Registrar and to complete required exit procedures. The request must specify reasons for leaving the institution. The date of the withdrawal will be established according to the guidelines contained in the institutional policies governing term withdrawals or as determined by the Registrar.

The student may be eligible for a full or partial refund of registration fees depending upon the time and circumstances of withdrawal. A written application for refund is required. Specific limiting dates and application procedures are published in the quarterly *Class Schedule*.

Withdrawal from Previous Terms

The student may petition to withdraw from a previous term if the request is submitted within one calendar year following the end of the term. The petition will be reviewed by the Committee for Retroactive Withdrawal. For more information, contact the Registrar's Office.

Academic Renewal

Academic Renewal is a policy which permits the removal of previous academic work from bachelor's degree consideration. Under certain circumstances and upon request by the student, the university may disregard up to two semesters or three quarters of undergraduate coursework taken previously at Cal Poly or at another college. The sole purpose of this policy is to enable a student to graduate from Cal Poly in a timely manner; any request to disregard previous academic work for the purpose of improving grade point averages will not be considered under the terms of this policy.

The student may be eligible for Academic Renewal if the coursework to be disregarded is more than five years old and the student has since completed at least 22 units with a GPA of 3.00, 45 units with a 2.50, or 67 units with a 2.00 while enrolled at Cal Poly. Work completed at another institution cannot be used to satisfy this requirement. Other eligibility restrictions exist. Additional information and applications may be obtained from the Registrar's Office.

ACADEMIC STANDARDS

ACADEMIC OBLIGATIONS

All students are expected to be diligent in the pursuit of their courses of study in order that both they and the State will receive maximum benefit from the educational opportunities provided.

Students are expected to satisfy the academic demands required by their instructors in such ways as they may set forth, in order to satisfy the instructor that they are performing their assignments in a proper manner.

Instructors are expected to give first priority to meeting their scheduled classes and other assigned responsibilities, including keeping regular office hours for student conferences.

An instructor, with the President's approval, may at any time exclude from a course any student guilty of unbecoming or disorderly conduct toward the instructor or the class. The instructor may refer the case of misconduct to the Vice President for Student Affairs Office for disciplinary action.

Uniform standards for academic probation or disqualification, and for administrative-academic probation or disqualification, are in effect at all campuses of The California State University. Undergraduate students may be placed on academic probation and later be disqualified, or be placed on administrative-academic probation and later be disqualified, when they do not meet these standards.

Students who have been placed on academic probation, administrative-academic probation, or who have been notified of their disqualification may request review of such action by the dean of the school taking the action. Students who have been disqualified for inadequate progress or performance will not be readmitted until presentation of satisfactory evidence that they have improved their chances of academic success. The request for readmission will be referred to the dean of the school in which the student wishes to enroll.

Students on academic probation may not participate on intercollegiate teams nor may they hold positions of leadership in student organizations or student government groups. This includes, but is not limited to, such groups as: athletic teams, debate teams, drama casts, judging teams, ASI councils, boards and committees. Such students may not hold an office in a student organization, nor may they be editors, managers, or hold similar positions on student publications. However, students on academic probation may participate in such activities as club membership, intramurals, and music which do not include travel and the official representation of the university.

Certain groups may have set higher standards than the minimum for specific positions or areas of responsibility that require considerable commitments of time and energy.

ACADEMIC PROBATION AND DISQUALIFICATION

The quality of academic performance is considered in the determination of a student's eligibility to remain enrolled. An undergraduate student becomes subject to academic probation or disqualification under the conditions shown below. For minimum scholarship standards applicable to graduate and postbaccalaureate students see the Graduate Programs section.

I. Academic Probation:

An undergraduate student is automatically placed on academic probation when the grade point average drops below 2.0 (C). The grade point average applies to the current term, the Cal Poly cumulative, or the higher education cumulative. All of these are provided on the student grade form.

II. Academic Disqualification:

- A. An undergraduate student on academic probation for two consecutive terms is subject to academic disqualification.
- B. An undergraduate student on academic probation is subject to disqualification when:
 1. As a freshman or sophomore student (less than 90 quarter units of college credit completed) the student is 22.5 or more quality points below a 2.00 (C) in all units attempted (higher education GPA) or in all units attempted at Cal Poly (Cal Poly cumulative GPA).
 2. As a junior student (90 to 134 quarter units of college credit completed) the student is 13.5 or more quality points below a 2.00 (C) in all units attempted (higher education GPA) or in all units attempted at Cal Poly (Cal Poly cumulative GPA).
 3. As a senior student (135 or more quarter units of college credit completed) the student is 9 or more quality points below a 2.00 (C) in all units attempted (higher education GPA) or in all units attempted at Cal Poly (Cal Poly cumulative GPA).

- C. In addition to the above disqualification standards applicable to students on probation, the President may designate a campus official to act to disqualify an individual not on probation when the following circumstances exist:
 1. At the end of any term, the student has fewer cumulative grade points than cumulative units attempted, and
 2. The cumulative grade point deficiency is so great that in view of the student's overall educational record, it seems unlikely that the deficiency will be removed within a reasonable period.

A student who is placed on probation or who is subject to disqualification at the end of an enrollment period will be notified by a message on the grade report which is issued following the end of the term in which the student's performance fails to meet the prescribed conditions. In cases where a student ordinarily would be disqualified at the end of a term save for the impossibility of making timely notification, the student may be advised by the student's school dean that the disqualification is to be effective at the end of the next term.

ADMINISTRATIVE-ACADEMIC PROBATION OR DISQUALIFICATION

An undergraduate or graduate student may be placed on administrative-academic probation by action of the dean of the school in which the student is enrolled 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.
- B. Repeated failure to progress toward the stated degree or program objective 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.

When such action is taken, written notice will be provided including a statement of the conditions for removal from probation and the circumstances which would lead to disqualification, should probation not be removed. If disqualified, the student will receive written notification from the dean of the school in which the student is enrolled including an explanation of the basis for the action.

ELIGIBILITY FOR INTERCOLLEGIATE ATHLETICS

Eligibility for competition in intercollegiate athletics is regulated in general by the rules of the National Collegiate Athletic Association (NCAA), and specifically by current Conference and university regulations. The Director of Athletics is responsible for maintaining up-to-date intercollegiate athletics eligibility rules applicable to the university. The Faculty Athletic Representative has the responsibility for the interpretation of the NCAA, Conference,

and university rules for determining student eligibility to represent the university in intercollegiate athletic events.

ELIGIBILITY FOR STUDENT ACTIVITIES

Students on either academic or disciplinary probation may not participate on intercollegiate teams nor may they hold positions of leadership in chartered student organizations or coded student government groups. Students on probation may participate in such student organizations and groups as members but they may not hold an office or represent the university or the Associated Students, Incorporated, in any official capacity.

STUDENT GRIEVANCE PROCEDURES

Academic procedures are handled through the academic division of the university. The process of review includes the department, dean, and academic vice president, whose decision is final. Typical academic procedures include transfer from one program to another, admissions, records, application of credit, program requirements, and academic standing. Matters reviewed by the Office of Student Affairs can be found in the section on Campus Student Relations and Judicial Affairs, and as noted below.

The university, through the Office of Student Affairs, provides grievance procedures for students who feel aggrieved in their relationships with the university, its policies, practices, and procedures or its faculty and staff.

The Fairness Board

The Fairness Board is the campus group primarily concerned with providing "due process" for the students and instructors at the university, particularly in terms of student/faculty relationships. The Board hears grade appeals based on the grievant's belief that the instructor has made a mistake, shown bad faith or incompetence, or been unfair. In all cases, the Board's authority is limited to actions consistent with other campus and system policies.

Details and procedures relating to the operation of the Fairness Board may be obtained from the *Campus Administrative Manual* located in departmental offices, library, Academic Senate Office, or from the Office of Student Affairs.

STUDENT CONDUCT AND DISCIPLINE

It is expected that all Cal Poly students are enrolled for serious educational pursuits and that they will conduct themselves so as to preserve an appropriate atmosphere of learning. It is also expected that all students who enroll at Cal Poly are willing to assume the responsibilities of citizenship in the campus community. Association in such a community is 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 campus authority which includes the prerogative of dismissing those whose conduct is inimical to the aims of an institution of higher education.

While enrolled, students are subject to the regulations governing discipline stated in *Education Code* Section 66017 and in Title 5 of the *California Code of Regulations*, Sections 41301–41304, and to such rules and regulations as have been approved and promulgated by authority of the President. Copies of Title 5 *California Code of Regulations* 41301 and 41302, which deal specifically with student disciplinary regulations, are available to all students in the "Appendix" of this catalog, through the "Campus Rules" section printed in the *Class Schedule* for each quarter, and are posted officially in the Administration Building. Other applicable regulations are contained in this Catalog, in the *Campus Administrative Manual*, the *Code of Student Rights and Responsibilities*, and in other official university publications.

STUDENT DISCIPLINARY PROCEDURES

The Chancellor of The California State University has established procedures for student disciplinary matters which are included in the *Campus Administrative Manual*, the official campus publication of policies and procedures which is available in the library for easy reference.

Educating students to their responsibilities as good citizens of the university and of the community is a campus-wide responsibility requiring the cooperation and understanding of the entire campus. Title 5 of the *California Code of Regulations* assigns to the President responsibility for enforcement of student disciplinary regulations. The President has delegated to the Director of Judicial Affairs the responsibility and commensurate authority to administer student disciplinary regulations and has delegated decision-making authority on cases which proceed to a hearing at the local campus level to the Vice President of Student Affairs.

When the conduct or behavior of a student is such that there is an alleged violation of applicable provisions of the *Education Code*, regulations of the Board of Trustees, and campus rules and orders issued thereunder, the case is referred to the Director of Judicial Affairs for investigation of the facts leading to the allegation. If the investigation reveals that there is reason to believe that an infraction has been committed by a student, disciplinary procedures as described in the *Campus Administrative Manual* will be initiated.

PROCEDURAL DUE PROCESS

In all matters of student discipline, each person charged with a violation is given every courtesy, privilege, and right under the law and within the context of the uniqueness of a public institution of higher learning. Procedural Due Process is inherent and assured in all Judicial Proceedings.



PREHISTORIC DNA

Achieving a scientific first, biology professor Raul Cano and student Hendrik Poinar have cloned strands of genetic material from prehistoric insects entombed in amber. The insects have been extinct for millions of years and the pair discovered that the insect DNA is viable. The research began as Hendrik's Cal Poly senior project with Dr. Cano as adviser, and together their results have gained world-wide attention. At Cal Poly since 1974, Cano says his first love is teaching. *Photo by Marty Sconduto, Art and Design, 1994.*

GRADUATE

PROGRAMS

GRADUATE PROGRAMS

Research and Graduate Programs Office
Mathematics & Home Economics Bldg. (38), Room 155
805 756-1508 FAX 805 756-1725

MASTER'S DEGREE PROGRAMS

Aeronautical Engineering, M.S.
Agriculture, M.S.
Architecture, M.S.
Biological Sciences, M.S.
Business Administration, M.B.A.
City and Regional Planning, M.C.R.P.
Civil and Environmental Engineering, M.S.
Computer Science, M.S.
Education, M.A.
Electronic and Electrical Engineering, M.S.
Engineering, M.S.
Engineering Management, MBA/MS
English, M.A.
Industrial and Technical Studies, M.A.
Mathematics, M.S.
Physical Education, M.S.
Psychology, M.S.
Transportation planning, M.C.R.P./M.S.

Cal Poly offers studies leading to advanced degrees through the existing instructional departments. Graduate and undergraduate instruction share laboratories and other academic resources.

University policy governing graduate study emphasizes the need for students to demonstrate maturity, responsibility and scholarly integrity. Graduate students should have a command of the basic knowledge, techniques, and skills essential for independent and self-directed study.

In graduate courses students cope with more complex ideas, problems, techniques and materials than in undergraduate courses. Graduate study requires searching and exhaustive analysis, identification and investigation of theories and principles; application of theory to new ideas, problems, and materials; extensive use of bibliographic and other resource materials, with emphasis on primary sources for data; and demonstration of competence in scholarly presentation of the results of independent study.

Regulations governing fees, grading, and financial aid are located elsewhere in the catalog. This section of the catalog reviews university definitions of policy and minimum requirements governing graduate studies. It is not, however, all inclusive.

Within these general requirements there are specific departmental requirements for each degree. These will be found in the descriptions of master's degree programs within each school description. It is important that graduate students, in consultation with their advisers, familiarize themselves with these requirements. Failure to do so may result in a substantial delay in progress towards the degree and graduation. It is the responsibility of the student to ascertain and comply with all university, college and departmental procedures and requirements.

APPLICATION FOR ADMISSION

An application for graduate studies may be obtained from the Admissions Office of any CSU campus or from the graduate coordinator in the program to which you are applying at Cal Poly. The application form and official transcripts should be sent directly to the Admissions Office at Cal Poly.

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 alternate 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 to submit separate applications (including fees) to each.

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. Transcripts must be official and sent directly from the issuing institution in a sealed envelope. 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*).

All master's and credential candidates need to submit the following documents to the Office of Admissions to establish their admission portfolio:

- Application for graduate admission
- \$55 application fee
- Official transcripts from all schools attended

Master's and credential candidates may file an application for admission at any time. In order to be considered for admission in the "targeted" quarter, the portfolio must be completed by the dates listed below. Students may request to have incomplete portfolios roll forward to the next available quarter by submitting another \$55 application fee.

FILE COMPLETION DATES

Graduate coordinators may select advanced file completion dates. Students should check with their departments for appropriate filing periods.

Quarter	Master's	Credential
Summer	April 1 <i>No applications taken for Summer: MA Educ, Counseling & Guidance</i>	April 1
Fall	July 1 <i>Applications taken only for Fall: MS Psychology - Feb. 15</i>	May 15
Winter	Nov. 1	Oct. 15
Spring	March 1	Dec. 15

All completed portfolios are forwarded to the graduate coordinators for admission recommendations. The coordinators may request additional documentation to determine eligibility. The documentation may include letters of reference, GRE or GMAT scores, or writing samples.

GRADUATE AND POSTBACCALAUREATE ADMISSION REQUIREMENTS

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 as follows:

- **General Requirements** – The general requirements for admission to graduate and postbaccalaureate studies at a California State University campus are in accordance with university regulations as well as Title 5, chapter 1, subchapter 3 of the *California Code of Regulations*.

Specifically, a student shall:

- (1) have completed a four-year college course of study and hold an acceptable baccalaureate degree from an institution accredited by a regional accrediting association, or shall have completed equivalent academic preparation as determined by appropriate campus authorities;

- (2) be in good academic standing at the last college or university attended;

- (3) have attained a grade point average of at least 2.5 (A = 4.0) in the last 60 semester (90 quarter) units attempted; and

- (4) satisfactorily meet the professional, personal, scholastic, and other standards for graduate study, including qualifying examinations, as appropriate campus authorities may prescribe. In unusual circumstances, a campus may make exceptions to these criteria.

If candidates meet the minimum requirements for graduate and postbaccalaureate studies, they will be considered for admission in one of four categories:

- **Postbaccalaureate Unclassified** – To enroll in courses for professional or personal growth, a candidate must be admitted as a postbaccalaureate unclassified student. By meeting the general requirements, the candidate is eligible for admission as a postbaccalaureate unclassified student. Some departments may restrict enrollment of unclassified students because of heavy enrollment pressure.

Admission in this status does not constitute admission to, or assurance of consideration for admission to, any graduate degree or credential program. Admission requires approval from the Dean of Research and Graduate Programs.

- **Postbaccalaureate Classified** – Candidates who wish to enroll in a credential or certificate program will be required to satisfy additional professional, personal, scholastic, and other standards, including qualifying examinations, prescribed by the campus.
- **Graduate Conditionally Classified** – Candidates may be admitted to a graduate degree program in this category if, in the opinion of appropriate campus authority, deficiencies can be remedied by additional preparation.
- **Graduate Classified** – To pursue a graduate degree, candidates will be required to fulfill all of the professional, personal, scholastic, and other standards, including qualifying examinations, prescribed by the campus.

Provisional Postbaccalaureate – Applicants who are completing undergraduate degree requirements and plan to graduate the term preceding post-baccalaureate enrollment, and therefore cannot provide proof of a degree, may be admitted on a "provisional" basis. Provisional admission requires that you provide an official transcript verifying that your degree was awarded for a term that precedes your enrollment as a graduate student.

If your transcript is not received by the Admissions Office prior to the first day of what would be your second quarter,

or if your degree was not awarded for a preceding term, you will be required to reapply for a subsequent quarter. You may only be accepted as a provisional postbaccalaureate student once. A second application and fee to a postbaccalaureate program will not be accepted or processed until an official transcript is provided showing that your undergraduate degree has been awarded.

Unless proof of an undergraduate degree is provided by the registration date for your second quarter, you will lose your registration priority. Your undergraduate degree must be awarded at least one quarter prior to the quarter that you enter a postbaccalaureate program at Cal Poly or your provisional acceptance is no longer valid.

Under special circumstances graduate coordinators may recommend admission of applicants who do not meet eligibility requirements. The Dean of Graduate Programs will act on the request for graduate admission.

Residency Status Determination

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. A detailed explanation of residence requirements appears on page 57.

INTERNATIONAL (FOREIGN) STUDENT ADMISSION REQUIREMENTS

International master's and credential candidates must file an application for admission with the Office of Admission. For this purpose, "foreign students" include those who hold U.S. visas as students, exchange visitors, or in other non-immigrant classifications. The application may be filed at any time, but in order to be considered for admission in the targeted quarter the portfolio must be completed by the dates listed below. Students may request to have incomplete portfolios roll forward to the next available quarter by submitting another \$55 application fee.

International Student File Completion Dates

Summer	April 1
Fall	June 1
Winter	October 1
Spring	February 1

All graduate master's and credential candidates need to submit the following documents to establish their admission portfolio:

- Application form
- \$55 application fee
- Official transcripts from all schools attended showing coursework. All official documents must be accompanied by a certified English translation from:

- Institute for International Education (IIE)
- AMIDEAST
- Saudi Arabian Education Mission
- United States Embassy or Consulate
- Two letters of recommendation from instructors, professors or professional references
- Confidential financial statement
- Certificate of Health
- International Educational Background form
- TWE (Test of Written English) with a score of 4.5 or better
- TOEFL (Test of English as a Foreign Language) with score of 550 or more.

The Office of Admissions will complete an initial portfolio review that will include verification of an equivalent B.A./B.S. degree, a determination of the appropriate level of study and a narrative evaluation of all work completed. Copies will be included in the candidate's file.

The Office of Admissions will notify all candidates of the documents needed to complete their portfolio. Graduate coordinators may require additional documentation on any candidate to assist them in determining that candidate's eligibility.

International candidates for graduate study can receive either conditional or classified admission. The graduate coordinators will make all recommendations for conditional and classified admissions to the graduate program to the Director of Admissions.

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 admission 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. See page 82 for more information.

ACADEMIC REQUIREMENTS AND RESPONSIBILITIES

The following conditions and requirements are common to all master's degrees:

- A student shall take the standardized tests required in the area of the master's degree objective on dates announced by the Testing Center of the university. These tests must be applied for by designated times, well in advance of testing, on forms supplied by the Testing Center. Payment of fees must accompany the form. If the specific tests required in the student's master's degree program have been taken elsewhere, the student must consult with the Testing Center to transfer the results to the Cal Poly Center as soon as possible and arrange for subsequent transfer of test results to the department concerned.

- All students shall attempt to satisfy the graduation writing requirement during the first quarter of enrollment.
- A student shall file an approved formal study plan before the twelfth unit of graduate study is completed.
- A student shall maintain a grade point average of 3.0 (grade of B on a scale where A = 4.0), or better, in all units attempted subsequent to admission to the program, as well as in all courses in the formal program of study. A course in which no letter grade is assigned shall not be used in computing the grade point average.
- A student shall maintain satisfactory scholarship and professional standards. Only those graduate students who continue to demonstrate a satisfactory level of scholastic competence and fitness, as determined by the appropriate university authorities, shall be eligible to continue in such curricula. Students whose performance is judged to be unsatisfactory by the authorities of the university may be required to withdraw from all graduate degree curricula offered by the university.
- A student shall be formally advanced to candidacy before being allowed to enroll for thesis or project units or to take the comprehensive examination.
- A student shall successfully complete a culminating experience (thesis, project and/or comprehensive examination).
- A student shall complete all of the graduate work in the formal study plan within the seven-year period preceding the date when all the requirements for the degree have been met.
- A student may elect to meet the graduation requirements in effect in the catalog either at the time the student was admitted to graduate standing (conditional or classified) provided that continuous enrollment was maintained, or at the time of graduation. The student may be required to make substitutions for discontinued courses.

GENERAL POLICIES GOVERNING GRADUATE STUDIES

Academic Probation

A student who is enrolled in a graduate degree program in conditionally classified or classified standing shall be placed on academic probation for failure to maintain a cumulative grade point average of at least 3.0 (grade of B on a scale where A = 4.0) in all units attempted subsequent to admission to the program.

A student who has been admitted as postbaccalaureate-classified in order to pursue a single subject credential program shall be subject to academic probation for failure to maintain a cumulative grade point average of at least 3.0 in all units attempted subsequent to admission to postbaccalaureate standing. Please refer to the single subject department for specific requirements. A student pursuing a

multiple subject credential program shall maintain a cumulative grade point average of at least 3.0 in all units attempted subsequent to admission to postbaccalaureate standing.

A postbaccalaureate classified student in any of the specialist credential programs shall be subject to academic probation for failure to maintain a cumulative grade point average of at least 3.0 in all units attempted subsequent to admission to postbaccalaureate standing.

A postbaccalaureate unclassified student (one who has not been admitted to either a credential or graduate degree program) shall be subject to academic probation for failure to maintain a cumulative grade point average of at least 2.5 in all units attempted subsequent to admission to postbaccalaureate standing.

Academic Disqualification

A graduate or postbaccalaureate student shall be subject to disqualification if while on probation the student fails to achieve a sufficient grade point average to be removed from probationary status. Disqualification may be either from further registration in the program or from further enrollment at the university as determined by the student's school dean. Notification of disqualification will be made by the school's dean.

Administrative Academic Disqualification

A graduate student may also be placed on probation or may be disqualified by appropriate campus authorities for unsatisfactory scholastic progress regardless of grade point average. Such actions shall be limited to those arising from repeated withdrawal, failure to progress toward an educational objective or noncompliance with an academic requirement, and shall be consistent with guidelines issued by the Chancellor's Office.

Advancement to Candidacy

Advancement to candidacy recognizes that the student has demonstrated the ability to operate at and sustain a level of scholarly competence which is satisfactory for successful completion of the degree requirements. The student is then cleared for the final stages of the program which in addition to any remaining coursework will include the thesis, project, and/or comprehensive examination.

The student may request advancement to candidacy only after a formal program of study has been submitted, the graduation writing requirement has been satisfied, and sufficient coursework has been completed to allow the department to make a qualitative judgment, before the student may register for the thesis, project, or examination. The student must have been advanced to candidacy before he or she can enroll for the thesis or project report or sit for the comprehensive examination.

Advisement

Soon after enrollment students should contact the department for the assignment of an adviser in the area of their study. Students should meet with their advisers prior to registration for information concerning prerequisites, courses to be taken, and to develop an informal study plan. An informal study plan is a projection of initial coursework, including prerequisites, that the student will undertake prior to filing a formal study plan, or in lieu of the formal program of study if the student is a postbaccalaureate student without credential or degree objective.

Departmental advisers and graduate coordinators share the responsibility for advising master's degree students throughout their work on a degree. School or departmental graduate study committees approve completion of a master's degree program on the recommendation of the advisers. Students are urged to maintain a personal file of transcripts and other records of all undergraduate and graduate work undertaken and to make this file available whenever they seek advisement.

Change of Postbaccalaureate Objective

If students wish to change their postbaccalaureate objective, they must formally file this intention. A form available from the Records Office is used to obtain the necessary approvals.

Comprehensive Examination

A comprehensive examination is the culminating experience for the master's degree and assesses the student's ability to integrate knowledge, show critical and independent thinking, and demonstrate mastery of the subject matter. The results of the examination show independent thinking, appropriate organization, critical analysis and accuracy of documentation. A record of the examination questions and responses is maintained.

Courses Counting Towards Graduation and Credit/No Credit Grading

Only those letter-graded courses in which an A, B, or C is earned count towards satisfying the total unit requirement for the degree. Courses which are offered only on a credit/no credit basis will also satisfy the unit requirement if a credit grade is earned. The equivalent of an A or a B is required to earn credit in such courses.

Graduate students may elect to take courses which are not part of their formal program of study on a credit/no credit basis, subject to the conditions stated on page 83.

Credit by Exam for Coursework

See page 72.

Culminating Experience

The culminating experience for the granting of a graduate degree is the successful completion of a thesis, project or comprehensive examination. The quality of work

accomplished, including the quality of the writing, is the major consideration in judging the acceptability of the thesis, project, or comprehensive examination. The student must successfully complete the culminating experience required by the specific program to be granted a graduate degree.

Enrollment in Graduate Courses

To enroll in 500-level graduate courses a student must have postbaccalaureate standing, graduate standing, or permission of the instructor.

Formal Study Plan

The student should make an appointment with the adviser before the 12th unit of work is completed to develop a formal program of study for the master's degree. A formal study plan is an agreement between the student and the school on the specific coursework to be completed in order to fulfill the requirements of the master's degree. A copy of the study plan must be submitted to the Graduate Programs Office for review and final approval.

Certain 400 series courses may be completed by the graduate student as part of the degree program when this is consistent with university requirements, departmental master's degree specifications, and the candidate's formal program of study. No fewer than one-half of the units required for the degree shall be in courses organized primarily for graduate students (500 level). The student should always consult the adviser to make certain that only approved courses are selected since departmental requirements vary, and some courses are excluded.

Only 400- and 500-level courses are allowed in the 45 units of an approved graduate plan of study. In those programs where specific courses below the 400-level may be essential for a student's success, the student may be conditionally accepted to the program contingent upon completing those courses. Courses below the 400-level may not constitute any part of the approved 45 units in the plan of graduate study.

No fewer than 32 quarter units shall be completed in residence. A course taught "in residence" is normally a catalog offering or approved experimental course taught by a Cal Poly faculty member. Extension courses may not be used to fulfill the residence requirement. However, summer session courses and up to 12 units taken through concurrent enrollment can be counted as residence courses. Petitioned graduate courses taken at Cal Poly as an undergraduate count as taken in residence. Courses for which students received credit by examination may be petitioned to count as taken in residence. These situations are explained further below.

No more than 13 quarter units of approved extension courses shall be accepted for the master's degree. Regular extension courses may not be used to satisfy the residence requirement, but grades earned in these courses count in calculation of the student's grade point average if they are part of the formal study plan.

No more than 12 quarter units of approved concurrent enrollment shall be granted credit prior to the submission of a formal study plan. Concurrent enrollment courses are counted as residence credit.

No more than 12 quarter units of summer session shall be granted credit if taken prior to the submission of a formal program of study. Summer session courses are counted as residence credit.

In addition to the above rules governing in-residence courses, the following apply to courses included on the formal study plan:

No more than nine quarter units shall be in student teaching.

No more than nine quarter units shall be allowed for a thesis or project.

No more than 12 quarter units of approved postbaccalaureate (unclassified) course credit will be accepted for the master's degree.

Full-Time Graduate Student Status

A full-time graduate student is defined as one taking 8 or more units in a quarter. Students receiving financial aid may need to meet different requirements to be considered full-time and should consult with the Financial Aid Office. Normally students are not permitted to enroll in more than 16 units each quarter.

Grade Point Calculation for Graduate Degree

Satisfaction of the GPA requirement for the conferral of the master's degree requires a GPA of 3.0 or more in the courses taken in the formal study plan and a GPA of 3.0 or more in all units attempted subsequent to admission to the program for which the degree is awarded. The base for calculation of the overall grade point average includes graduate courses taken through extension and credential courses. Students who take courses primarily for enrichment or to satisfy deficiencies may elect to take them credit/no credit. Repeating a failed course does not remove a lower letter grade from the overall GPA calculation.

Graduate Courses Taken by Undergraduates for Graduate Credit

Undergraduates are not permitted to take courses in the 400 or 500 series for graduate credit until they are within 12 quarter units of graduation. Using a Petition for Special Consideration obtained for the Graduate Programs Office, students may request up to 9 units of graduate credit when the courses are not required for the baccalaureate degree.

Graduation

A student planning to graduate must request a final graduation evaluation from the Evaluations Office approximately two quarters prior to the anticipated date of degree completion. A student cannot graduate without this evaluation.

Those candidates for master's degrees who attain a grade point average which is in the upper ten percent of those graduating in their major in that academic year and whose grade point average is 3.75 or better may upon the recommendation of the school dean be designated as "Graduating with Distinction."

For information on diploma regulations, see page 74.

Graduation Requirement in Writing Proficiency

All students must demonstrate competency in writing skills as a requirement for graduation. Students may meet the graduation writing requirement through one of four options:

1. Passing the Writing Proficiency Exam.
2. Passing an approved 300-level composition course with a grade of C or better AND receiving certification of proficiency in writing from the instructor based on a 500-word in-class essay.
3. Passing an approved 300-level literature course with a grade of C or better AND receiving certification of proficiency in writing from the instructor based on a 500-word in-class essay.
4. Certifying that the graduate requirement was met as part of an undergraduate program of study at Cal Poly.

All graduate students must attempt to meet the Graduation Writing Requirement in the first quarter of residence. Each student should review his or her curricular requirements to determine which option is appropriate. If Option 4 is used, students must begin graduate coursework within seven years from the date the GWR was satisfied or the student will be required to fulfill the requirement using one of the other options. The requirement must be met before the student can be advanced to candidacy. Questions should be addressed to the Writing Skills Office, Agriculture Building (10), Room 130, 756-2067.

Leaves of Absence

Students are permitted to take a Planned Educational Leave or a Medical Leave and be absent for up to two calendar years. A written request by the student and approval by campus officials are required. The general guidelines for determining eligibility and approving requests for leaves of absence are listed below.

1. A Planned Educational Leave must be for a purpose which contributes to the student's educational objective and is approved by the student's major department head or chair.
2. A Medical Leave provides time for the student to receive treatment or to recover from a disabling injury or other medical condition and is approved by either the campus' Director of Health and Psychological Services or Disabled Student Services.

3. To be considered for an Educational Leave, the student must be eligible to enroll for the term in which the leave begins and not be on academic probation.
4. The application for Educational Leave must be initiated and approved before the leave begins and will not be granted retroactively; the Medical Leave begins the term following the student's last term in attendance and may be granted retroactively based on the student's personal situation.
5. A student on Educational or Medical Leave will be considered to be in continuous attendance with the purpose of returning to the same curriculum which was in effect when the leave began.
6. A student on Educational or Medical Leave will not be required to apply for readmission or pay an application fee provided that the student returns to the same major and returns within the time period agreed upon at the time the application was approved.
7. The student on leave may return and enroll for any term prior to the term when the leave is scheduled to end.
8. Neither leave will be extended beyond the two-year limitation for any reason.
9. Any student on leave who fails to return and enroll within the time limits specified by the leave agreement will be required to reapply for admission, pay the reapplication fee, and may be held to any new curriculum requirements which may be in effect.
10. Students are eligible to obtain two Educational Leaves during their careers at Cal Poly, including graduate school.
11. Students who take educational leaves are still required to complete their graduate degrees within the specified time limit.

Application forms and information concerning Leaves of Absence may be obtained from the Registrar's Office.

Prerequisites

Each master's degree program has specific prerequisites, both in courses and in grade point average. Deficiencies in prerequisites must be removed prior to advancement to classified graduate status. Courses taken for this purpose normally will not count toward fulfillment of the unit requirement for the degree.

Registration

The schedule and instructions for CAPTURE registration and payment of fees is published quarterly in the *Class Schedule* which may be purchased from the El Corral Bookstore prior to each quarter. The *Class Schedule* includes registration instructions and lists classes offered for the quarter. Detailed descriptions of courses are found in the back of this catalog.

Repeating a Course

Students may enroll in a course for credit more than once only if the catalog course description states that the course may be repeated for credit. An exception to this policy allows the repeating of a course in cases where a grade of D or F was received. However, for graduate students both grades will be reflected in the calculation of the grade point average. Graduate students are not eligible to repeat courses and remove the lower grade points from calculation of the GPA.

Research Involving Special Conditions

Research that involves the use of human subjects, vertebrate animals, or hazardous materials requires special campus review before the study begins. If your research involves any of these special conditions, check with your graduate coordinator and the Graduate Programs Office for procedures.

Residence Courses

See "Formal Study Plan."

Returning Students

Matriculated students who have not registered for three consecutive quarters and have not been on an approved leave of absence must file an application for readmission before the deadline dates listed below. The application fee must accompany the application for readmission.

Matriculated students who have not registered for one quarter or two consecutive quarters will be entitled to their registration priority without applying for readmission. Summer Quarter is a regular quarter and is counted in determining the length of absence.

Application Deadlines for Returning Students

Summer Quarter	April 1
Fall Quarter	July 1
Winter Quarter	October 1
Spring Quarter.....	March 1

Second Master's Degree

A student can earn only one master's degree in any one of the graduate programs offered. A student who wishes to complete a second master's degree in another discipline or two master's degrees simultaneously must complete all the requirements for both degrees. Of the units required in common for each degree, no more than nine quarter units of coursework may be used to satisfy requirements in both master's degree programs.

Thesis or Project Report Requirements

A thesis is the written product of a systematic study of a significant problem. It identifies the problem, states the major assumptions, explains the significance of the undertaking, sets forth the sources for and methods of gathering information, analyzes the data, and offers a conclusion or

recommendation. The finished product evidences originality, critical and independent thinking, appropriate organization and format, and thorough documentation. Normally, an oral defense of the thesis is required.

A project is a significant undertaking appropriate to the fine and applied arts or to professional fields. It evidences originality and independent thinking, appropriate form and organization, and a rationale. It is described and summarized in a written report that includes the project's significance, objectives, methodology, and a conclusion or recommendation. An oral defense of the project may be required.

The following are minimum requirements for a thesis or project committee: 1) that the graduate student have a thesis or project adviser who is a permanent full-time faculty member from the student's department; 2) that the thesis adviser and the student recommend, for approval by the graduate coordinator and/or department head, a thesis or project committee comprising at least three permanent full-time faculty members; 3) that two of these members, one of which will be the chair, be from the student's department.

If a thesis or project is required in a master's degree program, a committee-approved copy must be completed in accordance with university specifications. Guidelines to be followed in preparing final copy for filing with the university can be obtained from the Graduate Programs Office.

A copy of the thesis or project report must be received and reviewed by the Thesis Editor in the Graduate Programs Office. Upon completion of any required corrections, a copy ready for binding is filed with the Graduate Programs Office for submission to the University Library. These steps must be completed before the degree will be awarded.

Time Limit for Degree

The time allowed to complete coursework in the formal study plan is seven years. The university, at its option, and in exceptional cases, may extend the time frame. Students who

wish to extend the seven year limit must file a graduate student petition for special consideration explaining the reasons why the extension is necessary, what courses are requested for inclusion in the study plan (that are over 7 years old at the proposed time of graduation), and what evidence is offered to support claims of currency in that coursework.

DAIRY SCIENCE INSTRUCTIONAL CENTER

A state-of-the-art dairy production facility, with current automation and computer technology for milk production, completed summer 1993. Students are employed on a part-time basis to work in both the production and processing areas. Students: Rich Silacci and Wendy Gansberg. Photos by Doug Allen.



College

of

AGRICULTURE

College of Agriculture

**Agricultural Sciences Bldg. (11), Room 211
(805) 756-2161**

Joseph Jen, Dean

Walter Mark, Associate Dean

Phillip M. Doub, Director of Farm Systems

Joseph E. Sabol, Director of Outreach Services

Department/ Location:	Program:
College	Agriculture: MS Water Science: Minor
Agribusiness	Agricultural Business: BS, Minor
Agricultural Education	Agricultural Science: BS
Agricultural Engineering	Agricultural Engineering: BS Agricultural Systems Management: BS
Animal Science	Animal Science: BS Poultry Management: Minor
Crop Science	Crop Science: BS Fruit Science: BS Plant Protection Science: BS, Minor
Dairy Science	Dairy Science: BS
Food Science and Nutrition	Food Science: BS, Minor Nutritional Science: BS, Minor
Natural Resources Management	Forestry and Natural Resources: BS Recreation Administration: BS
Ornamental Horticulture	Ornamental Horticulture: BS
Soil Science	Soil Science: BS

The College of Agriculture offers programs reflecting the growing diversity of choices available and skills required in modern agriculture and its related professions.

Students take courses in their major field beginning with their first quarter of enrollment. This early exposure to their major provides them with knowledge of immediate interest to supplement that gained in other coursework in basic sciences, mathematics and the liberal arts. Moreover, it allows students to evaluate whether or not the curriculum selected is appropriate to their interests and abilities. Taking courses in the major throughout the academic program fosters personal contact with faculty and other students having common interests but varied backgrounds.

The students' early involvement in their major field, combined with the faculty's close contacts with schools, private industry, governmental agencies, and nonprofit organizations provide excellent opportunities for student internships during junior or senior years. Other opportunities

which enhance education, provide financial assistance, and help prepare students for the job market include enterprise projects, scholarships, and work-study jobs.

Student clubs are active in every department. The 43 clubs, most of which are affiliated with national professional organizations, provide an excellent forum for student and faculty interactions. Active club members may practice leadership skills, and attend national, state and local professional meetings, as well as participate in a variety of professional and social events.

Faculty in the College of Agriculture are experts in their disciplines, and are dedicated to teaching. They are eager to help students learn, are readily available for consultation, and are proud of their close relationship with students.

The Agriculture Education Department provides an additional program to credential candidates who wish to become secondary school teachers of Vocational Agriculture. In partnership with the Brock Center for Agricultural Communication, the department also offers an agricultural information emphasis.

The Master of Business Administration degree with an Agribusiness Specialization is offered by the College of Business in conjunction with the Agribusiness Department.

FACILITIES

The College of Agriculture facilities include a 6,000 acre farm having beef cattle, dairy cattle, horse, sheep, swine and poultry units, rodeo and horse show arenas, a horse training track, vineyards, irrigated and non-irrigated fields for various crops, citrus groves, avocado and deciduous orchards, an arboretum, and greenhouses. The college facilities also include several microcomputer laboratories, a market news information facility, an irrigation demonstration field, reservoirs, an agroforestry demonstration plot, laboratories with modern equipment for soil-plant-water testing, engineering testing and manufacturing shops, complete food processing units for dairy products, meats, fruit and vegetables.

The College of Agriculture also operates the 3,200 acre Swanton Pacific Ranch in Santa Cruz County which has been generously donated by Al Smith, alumnus of the Crop Science Department. This unit provides students with an opportunity to live and work on a commercial farm with forestry, cattle and crop production activities.

All of these facilities are for student use. They provide students with unique opportunities for hands-on experiences which augment the instruction received in the classroom.

COURSES

The courses offered in each agricultural curriculum may be grouped into four areas:

Courses in the major:

The required cluster of courses in which the student expects to graduate. These courses constitute the core of specific preparation for the student's major field in agriculture.

Support courses:

Courses in agriculture and closely allied fields which support and supplement the block of courses constituting the student's major.

General Education and Breadth:

Courses are selected from the physical and life sciences, mathematics, communications, and from human, social, political, and economic development areas. These courses furnish the student with background and support for agricultural courses as well as providing cultural background for the students' intelligent participation in a complex world society.

Electives:

Course selection in this area is designed to provide freedom for students to pursue interests of their choosing in any university department.

Recommended Preparation

In addition to pursuing the CSU mandated entrance requirements, high school and community college students are encouraged to participate in extra- and co-curricular activities as part of their preparation for admission to Cal Poly's College of Agriculture. These activities could include, but are not limited to, FFA, 4-H, leadership roles in school clubs, meaningful work experience and community organizations.

Laboratory Safety

Students are required to meet sanitation and safety regulations in laboratories. These regulations will be explained by the instructor at the first meeting of the class.

AGRICULTURAL ENTERPRISE PROJECT FACILITIES

The College of Agriculture utilizes the student enterprise program of the Cal Poly Foundation to provide practical experience which supplements the regular production courses. This enterprise program leads to a fuller understanding of important production and managerial problems in agriculture.

The College of Agriculture operates a campus farm which, with its equipment, buildings and livestock, is available to students for their use in conducting a wide variety of agricultural enterprise projects.

The Animal Science Department conducts student enterprise projects with beef cattle, swine, sheep, horses and poultry. The stock utilized by our students represents the best bloodlines in the nation.

The beef program includes registered herds of 150 cows, stocker programs averaging 200 head, a 300-head performance test facility, a 200-head feedlot, and 15-20 show steers. These cattle are managed in a variety of settings from environmentally controlled confinement to our 3,000 acre native range operation. The cattle are dispersed over six different ranches away from the campus core and four distinct areas on campus. These animals and facilities are utilized for student projects including cow-calf, feedlot, stocker, performance, and show cattle operations.

The sheep section includes purebred flocks of 70 Suffolk and 35 Hampshire ewes and a commercial range flock of 185 whiteface ewes. The sheep are housed on one ranch of 600 acres near, but not on campus, and a group of pastures and facilities closer in. Students become involved in commercial ewe, lamb feeding, range ram, ram test, and show lamb projects.

The swine herd consists of two major breeds—Yorkshires and Hampshires. The facilities include a 10-unit farrowing house and outside lots and pastures for the brood sows. In addition there are 24 feeder units for student projects with capacity for approximately 20 market hogs per unit. Between 400 and 500 market hogs are produced in student projects each year.

The Foundation horse herd is made up of the Thoroughbred and Quarter Horse breeds. An approximate total of 60 head of broodmares, foals, yearlings and riding stock are housed at the horse unit facilities. Currently standing at stud are three stallions: two Quarter Horses and one Thoroughbred.

Emphasis is placed on basic horse handling and training procedures leading up to the breeding and training of two-year-olds for in-training sales. These sales expose students to professionals and their ideas and expose the industry to what we do at Cal Poly.

The poultry flocks comprise some 5,000 birds. Student projects involve mostly broiler production, started pullet production, and egg production—plus duck, geese, turkeys, and game birds on a limited basis. The equipment includes a modern incubator, egg-handling facilities, and brooding and rearing equipment. Students care for all of the operations under the supervision of technicians and faculty.

The Dairy Science herd includes purebred Jerseys and Holsteins. The dairy has all the necessary facilities for feeding, milking, calf and bull raising, artificial insemination, and management practices. A separate dairy located on campus provides an opportunity for students with dairy

projects. A modern dairy plant is also available for milk processing and manufacturing by-products.

The Food Science and Nutrition Department is equipped with a food operation pilot plant and meat processing facilities. The laboratories contain many types of pilot scale commercial processing equipment. Students process foods under faculty supervision. Some examples are: jams, condiments, fresh and processed meats, baked goods and specialty products. All food products manufactured by student enterprise projects and class work are marketed in the Campus Store.

The Natural Resources Management Department has faculty expertise and facilities available for raising Christmas trees and for agroforestry. Students conducting forestry projects learn all aspects of tree farming from establishment to marketing. A large, well-equipped greenhouse facility is available for raising tree seedlings. Also, a large area of redwood and mixed hardwood forest land is available for student projects on the Swanton-Pacific Ranch near Santa Cruz.

The Ornamental Horticulture Department provides facilities consisting of fifteen greenhouses, six shade houses, extensive growing grounds, a sales area, a large plant tissue culture lab, extensive turf plots, disease and pest lab, and three large labs available for production. The unit has the latest equipment and machinery to facilitate student projects needs which encompass all phases of nursery and greenhouse production.

The Crop Science Department is well equipped with all types of machinery found on mechanized farms in California. All of the crop production and marketing operations are carried on under the supervision of the Crop Science Department through enterprise projects. Orchards, vineyards, crop land, fruit and vegetable packing facilities and marketing outlets are available for instructional purposes.

The Soil Science Department is equipped for the accurate analysis of soil and water with modern equipment and facilities. Under faculty supervision, Enterprise students have the opportunity to learn the management and operation of a soil and water testing program. The students provide soil and water data and information to home owners and growers for fertilizer practices in San Luis Obispo County.

WATER SCIENCE MINOR

The Water Science Minor emphasizes one of two areas of study: irrigation or watershed management. In California, 85% of the developed water is used for irrigation. Irrigation water use and management have tremendous impacts upon ground water quality, power usage, crop yields, surface water supplies and quality, drainage problems, and water availability for transfer to urban uses. For students interested in environment and water, the Water Science minor provides marketable skills.

Units

Basic Core 11

AE 340 Irrigation Water Management (4)
SS 121 Introductory Soil Science (4)
FNR 408 Water Resource Law and Policy (3)

Select one emphasis area 13-16

Irrigation Emphasis (13)

AE 237 Engineering Surveying (2)
A minimum of 11 units chosen from the following:
AE 331 Irrigation Theory (3)
AE 405 Chemigation (1)
AE 435 Drainage (3)
AE 440 Agricultural Irrigation Systems (4)
AE 492 Pumps and Pump Drivers (3)

Watershed Management Emphasis (16)

FNR 304 Ecology of Resource Areas (4)
FNR 440 Watershed Management (3)
FNR 441 Forest and Range Hydrology (3)
FNR 442 Watershed Protection (2)
SS 440 Forest and Range Soils (4)

24-27

Master of Science Degree in Agriculture

Programs

M.S. Agriculture

with Specializations in:

Agricultural Engineering Technology
Dairy Products Technology
Food Science and Nutrition
General Agriculture
International Agricultural Development
Soil Science

General Characteristics

Graduate studies in the College of Agriculture allow the student to pursue either a professional program designed to enhance the competencies of agricultural educators, or an academic program of graduate-level scholarly activities and research in one of several disciplines. The Master of Science degree program is intended to prepare graduates for (a) professional-level positions with private business and industry, government, and foreign service in agriculture and related fields; (b) agricultural teaching in secondary schools or community colleges; or (c) continued graduate work at other institutions. Although individual departments in the college do not offer advanced degrees, students may emphasize in their studies agricultural education, dairy products technology, international agriculture, agricultural engineering technology, soil science, crop science, food science and nutrition, forest and natural resources, or water resources. Applicants must select a specialization appropriate for their area of emphasis. The specializations are Agricultural Engineering Technology, Dairy Products Technology, Food Science and Nutrition, General Agriculture, International Agricultural Development, and Soil Science.

When to Apply

Application filing periods are given on page 90 of this catalog. To ensure adequate processing and full consideration, all application materials should be filed with the Cal Poly Admission's Office before the dates given below; nevertheless, applicants are encouraged to file during the initial filing period.

Fall Quarter July 1
Winter Quarter November 1
Spring Quarter March 1
Summer Quarter April 1

Prerequisites

Consideration for admission to this program as a classified graduate student requires a minimum grade point average of 2.75 in the last 90 quarter units attempted. An applicant not meeting these academic standards, but who meets the basic university standard of a grade point average of 2.5 in the last 90 quarter units attempted may be considered for admission as a postbaccalaureate student; such admission does not

constitute admission to graduate degree standing (refer to page 90). A change from postbaccalaureate status to graduate status requires application and additional processing through the university's admissions office.

An applicant meeting the grade point requirement for classified graduate status, but who is deficient in background courses in agriculture, natural resources and/or related support disciplines may be considered for admission as a conditionally classified graduate student. Before such a student is advanced to classified graduate status, deficiencies in prerequisites must be removed and satisfactory academic performance in a graduate program must be demonstrated by the completion of no fewer than 12 units of specified courses with a minimum grade point average of 3.0. Courses taken to remove deficiencies in prerequisites will not count toward the unit requirement for the degree.

All applicants who do not speak and write English as their primary language are required to complete the Test of English as a Foreign Language (TOEFL), with a minimum score of 550, and the Test of Written English (TWE), with a minimum score of 4.5.

Program of Study

The College of Agriculture graduate program includes the following specializations: Agricultural Engineering Technology, Dairy Products Technology, Food Science and Nutrition, General Agriculture, International Agricultural Development, and Soil Science. These specializations are founded on a core of courses which include thesis (required of all except agricultural educators) or internship (required of agricultural educators), a research methods or educational program development course, and one of the graduate seminars offered in the college. Although the program offers several specializations, there is a single degree; students may not earn more than one Master of Science degree in the College of Agriculture.

The thesis is based on independent, supervised research; students should contact individual departments to determine the availability of funding support for their research. The final copy of the thesis must meet the standards explained in the "Manual of Instructions for the Preparation and Submission of the Master's Thesis or Master's Project" available from the Cal Poly Graduate Studies Office. At least one course in statistical methods and/or experimental design is required of students in a thesis curriculum.

Graduate students must file the formal program of study for the degree with the Graduate Studies Coordinator of the College of Agriculture no later than the end of the quarter in which the 12th unit of approved courses is completed. The formal program of study must include at least 45 units of committee-approved graduate coursework; at least half of the minimum units required must be at the 500 level. Students should refer to the course descriptions in this catalog for

credit limitations of individual courses; for example, total credit for AG 500, Individual Study, is limited to six units.

Students also should refer to the Graduate Program Guidelines obtainable from the college's Graduate Studies Coordinator.

All students must pass the Graduation Writing Requirement by earning a score of 10 or higher (12 possible) on the Writing Proficiency Exam (WPE) or by completing ENGL 302 or ENGL 318 with a grade of A or B prior to advancement to candidacy. ENGL 302 or ENGL 318 may not be used to satisfy course or unit requirements in the Master of Science program.

All students are required to pass both a written and an oral comprehensive examination which normally are given during the final quarter of the program of study. Successful completion of the written comprehensive examination is required before the student may take the final oral comprehensive examination. For students in a thesis program, the final oral comprehensive examination will include, but not necessarily be limited to, a defense of the thesis.

Requirements of the various specializations are given in the curriculum display following this section. Please note that the General Agriculture Specialization is designed for either agricultural educators or others who seek graduate work (including thesis-directed research) in certain disciplines not having a specialized curriculum; these disciplines include crop science, forest and resources, and water resources.

M.S. AGRICULTURE, SPECIALIZATION IN AGRICULTURAL ENGINEERING TECHNOLOGY

	Units
Core Courses	12
AG 599 Thesis (6)	
400-500 level research methods course (3)	
AE 581 Graduate Seminar in Agricultural Engineering (3)	
Required in the specialization	9
AE 521, AE 522, AE 533	
Restricted electives	18
At least 9 units must be in computer related coursework; remaining units shall be approved by the student's Graduate Studies Committee. At least 6 units must be at the 500 level.	
Electives	6
400-500 level courses approved by the student's graduate committee.	
	<hr/> 45

M.S. AGRICULTURE, SPECIALIZATION IN DAIRY PRODUCTS TECHNOLOGY

	Units
Core Courses	12
AG 599 Thesis (6)	
FSN 581 Graduate Seminar (3)	
SS 501 Research Planning (3)	
Required in the specialization	12
DSCI 401 Physical and Chemical Properties of Dairy Products (3)	
DSCI 402 Quality Assurance of Dairy Products (3)	
DSCI 433 Dairy Plant Management and Equipment (3)	
DSCI 522 Bioseparation Processes Dairy Tech (3)	
Restricted electives	21
AE 500 Individual Study (1-6)	
AE 521 Engineering of Agricultural Systems (4)	
AE 522 Instrumentation Control/Microprocessors (4)	
CHEM 528 Nutritional Biochemistry (3)	
FSN 501 Lipid Metabolism and Nutrition (3)	
STAT 512 Statistical Methods (4)	

45

M.S. AGRICULTURE, SPECIALIZATION IN FOOD SCIENCE AND NUTRITION

	Units
Core Courses	12
FSN 599 Thesis (6)	
FSN 581 Graduate Seminar (3)	
SS 501 Research Planning (3)	
Required in the specialization	12
AG 500 Individual Study (3-6)	
FSN 410 Nutritional Aspects of Food Processing (3)	
FSN 501 Lipid Metabolism and Nutrition (3)	
STAT 512 Statistical Methods (4)	
Approved electives	12
AE 425 Computer Controls in Agriculture (3)	
AE 521 Engineering of Agricultural Systems (4)	
AE 522 Instrumentation Control/Microprocessors (4)	
BIO 431 Physiology I: General (4)	
CHEM 435 Food Analysis (4)	
CHEM 436 Agricultural Chemicals (4)	
CHEM 439 Instrument Analysis (5)	
CHEM 528 Nutritional Biochemistry (3)	
EDUC 555 Counseling and Communication (4)	
FSN 407 Food Composition Science (4)	
FSN 409 Sensory Evaluation of Food (4)	
FSN 431 Advanced Muscle Food Science (3)	
FSN 437 Advanced Food Processing (4)	
PE 451 Nutrition for Fitness and Sport (3)	
Electives (400-500 level courses)	9

45

M.S. AGRICULTURE, SPECIALIZATION IN GENERAL AGRICULTURE

	<i>Units</i>
Core Courses	12
<i>Required of agricultural educators:</i>	
AG 539 Internship (6)	
AGED 520 Program Development in Agricultural Education (3)	
AGED 522 Instructional Programs in Agricultural Mechanics (3)	
<i>Required of students other than agricultural educators:</i>	
AG 599 Thesis (6)	
400- or 500-level research methods course (3)	
Any 581 Graduate Seminar offered in College of Agriculture (3)	
Restricted electives	27
<i>For agricultural educators:</i>	
Any approved 400- and 500-level agriculture courses. No less than 11 units must be at the 500 level.	
<i>For students other than agricultural educators:</i>	
Any 400- and 500-level courses approved by the student's graduate committee. At least 12 units must be at the 500 level.	
Electives	6
Any 400- and 500-level course approved by the student's graduate committee. All agricultural education students are required to complete one year of successful teaching or graduate level internship prior to the final examination.	
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M.S. AGRICULTURE, SPECIALIZATION IN INTERNATIONAL AGRICULTURAL DEVELOPMENT

The International Agricultural Development specialization is a management oriented program designed primarily for enhancing the technical skills of returning Peace Corp volunteers and individuals that seek specialized employment in developing countries.

Prerequisite: A bachelor's degree with background courses that include macroeconomics, microeconomics, crop production, general soils, and agricultural irrigation. Students may complete prerequisite coursework at Cal Poly if necessary.

	<i>Units</i>
Core Courses	26
AG 599 Thesis (6)	
AGB 510 World Agriculture Development (3)	
AGB 515 International Agriculture Marketing (3)	
AGB 516 Program Management in Developing Countries (3)	
AGB 421/AGB 435/AE 521 (3/4)	
SS 453 Tropical Soils (4)	
400-500 level research/statistical methods course (3)	

Restricted electives to be selected with adviser's approval	11
Courses to be selected from an area of emphasis in Agroforestry Technology, Cropping Systems Technology, or Irrigation Technology.	
Global Requirement	6
Any suitable combination of 400-500 level courses from ECON, POLS, GEOG, ANT, and HIST. To be approved by student's graduate committee.	
Electives	3
To be selected from any 400-500 level course approved by the student's graduate committee.	
	<hr/> 46

M.S. AGRICULTURE, SPECIALIZATION IN SOIL SCIENCE

Prerequisite: B.S. degree in Soil Science, related field or physical or biological sciences, or a B.A. degree with proficiency in the basic sciences (chemistry, physics, botany, biology, and statistics). A computer science or applied computer science course. Students may complete prerequisite courses at Cal Poly if necessary.

	<i>Units</i>
Core courses	12
SS 501 Research Planning (3)	
SS 581 Graduate Seminar in Soil Science (3)	
SS 599 Thesis (6)	
Required in the specialization	9
SS 508 Landscape Management for Erosion Control (3)	
SS 522 Advanced Soil Fertility (3)	
SS 582 Advanced Land Management (3)	
Electives	24
400-500 level courses approved by the student's graduate committee. At least 6 units of electives must be from outside of the College of Agriculture.	
	<hr/> 45

MBA, SPECIALIZATION IN AGRIBUSINESS

The College of Business and the Agribusiness Department jointly offer an Agribusiness Specialization in the Master of Business Administration program. The program is part of the two-year MBA curriculum and requires the completion of six graduate classes taught by the Agribusiness Department (see the College of Business). Information and application materials may be obtained by writing to the MBA Coordinator, College of Business.

MS ENGINEERING, SPECIALIZATION IN WATER ENGINEERING

The College of Engineering and the Agricultural Engineering Department jointly offer the Water Engineering Specialization under the MS Engineering. Please see College of Engineering section of this catalog for more information.

AGRIBUSINESS DEPARTMENT

Agriculture Bldg. (10), Room 210
(805) 756-5000
(805) 756-5040 (FAX)

Faculty

Department Head, M. LeRoy Davis

James J. Ahern	Robert E. McCorkle
William H. Amspacher	Stephen D. McGary
Renny J. Avey	Nancy C. Ochs
Daniel W. Block	David J. Schaffner
Phillip M. Doub	Jack F. Scott
Arthur C. Duarte	Kenneth C. Scott
Douglas G. Genereux	Robert C. Thompson
George J. Hellyer	Stanton G. Ullerich
Jack J. Herlihy	Marlin D. Vix

Programs

B.S. Agricultural Business

with Concentrations in:

Agribusiness Finance and Appraisal
Agribusiness Marketing
Agribusiness Policy
Farm and Ranch Management

Agribusiness Minor

The Bachelor of Science degree in Agricultural Business emphasizes training in management for careers in agribusiness. The thrust of the program is to prepare students for careers in the management of firms that are part of the world's food system. The food system encompasses all the direct functions such as inputs to producers, production, processing, distribution, and marketing. In addition, emphasis is placed on the support functions such as finance, domestic policy, and international policy. The curriculum is based on a solid background in production agriculture.¹

CURRICULAR CONCENTRATIONS

Agribusiness Finance and Appraisal

Graduates of this concentration find employment opportunities with a variety of agricultural lending institutions such as commercial banks, the Farm Credit System, Farmers Home Administration, and large insurance companies. Positions include loan officer, branch manager, in-house appraiser and product specialist. Other possible careers include those of fee appraiser, financial officer in a large agricultural firm, and agricultural real estate management and sales.

Agribusiness Marketing

Career placement opportunities for graduates of this concentration involve management operations of agribusiness firms providing supplies and service to farmers and by those firms engaged in marketing, distribution, and sales of farm products. These careers include sales representatives for agricultural chemical organizations and fertilizer companies and may lead into more responsible management positions. Other careers are found in fresh fruit and vegetable marketing, advertising, food chains, food processing, and agricultural county and district fairs.

Agribusiness Policy

This concentration prepares students for employment as policy analysts and lobbyists for public agencies as well as private firms and organizations. Typical employers include agribusiness, farm organizations, commodity associations, agribusiness trade associations, government regulatory agencies and federal and state legislatures. The curriculum has been designed to enable students to meet the need of these employers by acquiring abilities to analyze the impacts of U.S. and foreign farm, food, resource, and trade policies.

Farm and Ranch Management

The successful American family farm or ranch is large enough and sufficiently complicated to require its operator to be qualified through professional management training and experience. Many Farm and Ranch Management graduates return to the family farm and, after gaining the seasoning of further experience, carry the farm business to greater levels of success. Graduates without family farm connections may find employment as supervisors on a large scale farm or ranch and advance to greater responsibility.

¹ The Business Administration major is distinguished from the major in Agricultural Business. The major in Business Administration provides students with the knowledge and analytical skills essential for employment in all sectors of business and industry, as well as for managerial careers in governmental and other non-profit organizations. Opportunities for specialization are provided for students preparing for careers in accounting, financial management, marketing management, management information systems, international business management, general management, production and operations management, and human resources management.

B.S. AGRICULTURAL BUSINESS

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements

AGB 101 Introduction to Agribusiness and Agricultural Economics.....	4
AGB 201 Agribusiness Sales and Service	3
AGB 212 Agricultural Economics	3
AGB 213 Agricultural Economic Analysis	4
AGB 301 Agricultural Marketing	3
AGB 310 Agribusiness Credit and Finance	3
AGB 312 Agricultural Policy.....	3
AGB 401 Agribusiness Labor Relations and Personnel Management	4
AGB 460 Research Methodology in Agribusiness	2
AGB 461, AGB 462 Senior Project	2,2
AG 250 Computer Applications Agriculture (F.1.)* ..	3
Concentration courses (see below).....	30
	<hr/> 66

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

ACTG 211 Financial Accounting for Nonbusiness Majors.....	4
BUS 207 Business Law	4
CHEM 121 General Chemistry (B.1.a.)*	4
CHEM 122 General Chemistry or Life science elective (B.1.) *	4
¹ ECON 222 Macroeconomics (D.3.)*	4
² MATH 118 Pre-Calculus Algebra or MATH 221 Calculus for Business and Economics (B.2.)*	4
SS 121 Introductory Soil Science	4
STAT 211 Elem. Probability and Statistics (B.2.)*	3
STAT 212 Statistical Methods	3
ASCI 231 or PM 230 or DSCI 230/231	3/4
FRSC 131/230 or CRSC 131/230 or VGSC 230 or OH 121.....	4
AE 340/FSN 230/CRSC 311	4
Restricted electives	15/16

12 to 16 units are to be selected in Agriculture with prefixes other than AGB, AGED, REC, MSC. Of these units, 6 to 8 units must be selected from the following courses: AE 340, 440; ASCI 304, 329, 401; CRSC 221, 311, 405, 431, 441; DSCI 301, 330; FSN 333; OH 340, 341, 342; SS 221, 433; VS 203, 312. Students may also select CHEM 326. No more than 3 units can come from courses with AG prefix, i.e., AG 243, AG 339. No more than 3 units can come from Enterprise Projects (i.e., CRSC 201, FSN 201, etc.) and Special Problems (i.e., CRSC 200, FSN 400, etc.)

Units

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	4
A minimum of 18 units is required; 15 of the units are in Support	
Physical science (B.1.a.)* see Support Courses	
Life science elective with lab (B.1.b.)	
Life/physical science (B.1.)* see Support Courses	
Mathematics/Statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3)	
Arts and humanities elective (Area C)	
Area D:	15
A minimum of 18 units is required; 4 of the units are in Support	
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
Economics (D.3.)* see Support Courses	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F	0
A minimum of 3 units is required; 3 of the units are in Major	
(F.1.)* see Major Courses	
Total.....	<hr/> 56
A minimum of 76 units is required; 22 of the units are in Major and Support	
ELECTIVES.....	9
	<hr/> 192

¹ AGB 212 is the prerequisite for ECON 222 for AGB majors, not ECON 221.

² MATH 116 and MATH 117 will substitute for MATH 118 and are taught at a slower pace for those who need more review. MATH 117 will satisfy GEB area B.2.

CONCENTRATIONS (select one)**Agribusiness Finance and Appraisal Concentration**

AGB 322 Principles of Farm Management.....	4
AGB 324 Agricultural Property Management and Sales	4
AGB 326 Farm Appraisal	4
AGB 331 Farm Accounting	4
AGB 410 Management Practices in Agricultural Lending	4
ECON 337 Money, Banking, and Credit	4
Adviser approved electives (300–400) in AGB or College of Business	6

30

Agribusiness Marketing Concentration

AGB 318 Agricultural Trade Policies	3
AGB 323 Agribusiness Managerial Accounting	4
AGB 405 Agribusiness Marketing Research Methods	3
AGB 406 Agribusiness Marketing Planning	4
AGB 421 Agribusiness Operations Analysis or AGB 433 Agricultural Price Analysis	4/3
AGB 450 Agribusiness Strategy Formulation	4
MKTG 301 Principles of Marketing	4
Adviser approved electives (300–400) in AGB or College of Business	4/5

30

Agribusiness Policy Concentration

AGB 302 Agricultural Associations and Cooperatives	3
AGB 315 Land Economics	3
AGB 317/AGB 409/HIST 305/GEOG 315	3
AGB 318 Agricultural Trade Policies	3
AGB 323 Agribusiness Managerial Accounting	4
AGB 412 Advanced Agricultural Policy	4
AGB 421 Agribusiness Operations Analysis or AGB 433 Agricultural Price Analysis	4/3
Adviser approved electives (300–400) in AGB or College of Business	6/7

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Farm and Ranch Management Concentration

AGB 321 Farm Records	4
AE 321 Agricultural Safety	3
(may count as Ag Production elective)	
AGB 322 Principles of Farm Management.....	4
AGB 331 Farm Accounting	4
AGB 433 Agricultural Price Analysis	3
AGB 435 Linear Programming in Agriculture	3
AGB 456/457/458 Crop/Livestock/Dairy Management Problems	4
Adviser approved electives (300–400) in AGB or College of Business	5

30

Recommended Sequence: Major and Support Courses

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
Fall	Winter	Spring
AGB 101	CHEM 121	Life Sci w/lab or CHEM 122
MATH 118/221	AGB 201	BUS 207
AG 250	ACTG 211	AGB 212
2nd Year		
Fall	Winter	Spring
SS 121	STAT 212	ECON 222
STAT 211	AGB 301	AGB 312
AGB 213	AGB 310	AGB conc. course
3rd Year		
Fall	Winter	Spring
AG elective	AG elective	AG elective
AGB/COB elective	AGB conc. course	AGB/COB elective
AGB conc. course	AGB conc. course	AGB conc. course
4th Year		
Fall	Winter	Spring
AGB 401	AG elective	AGB 462
AGB 460	AGB 461	AG elective
AGB conc. course	AGB conc. course	AG elective

AGRIBUSINESS MINOR

In today's ever more complex, technology-driven world, it is a necessity for any graduate in agriculture to have some exposure to marketing, personnel management, financial management, budgeting, and economics if they are to succeed. The minor is designed to give students in the College of Agriculture this opportunity. Interested students must apply for acceptance into the minor through the Agribusiness Department.

Required courses **Units** 17

- AGB 212 Agricultural Economics (3)
- AGB 301 Agricultural Marketing (3)
- AGB 310 Agribusiness Credit and Finance (3)
- AGB 401 Agribusiness Labor Relations and
Personnel Management (4)
- ACTG 211 Financial Accounting for Nonbusiness
Majors (4)

Three courses in area of emphasis..... 8-12

To be selected by the student and approved in advance by the Agribusiness Department Minor Coordinator.

In addition, students obtain more specialized training in either Agribusiness Marketing, Agribusiness Production Management, Agricultural Finance, Agricultural Policy, or in a pre-approved flex-minor curriculum. See the Agribusiness Minor Coordinator for details.

AGRICULTURAL EDUCATION DEPARTMENT

**Agriculture Bldg. (10), Room 244
(805) 756-2803**

Faculty

Department Head, Glen R. Casey

Robert A. Flores	Sarah S. Lord
William C. Kellogg	Joseph E. Sabol

Programs

B.S. Agricultural Science

with Concentrations in:

- Agricultural Mechanics
- Agricultural Products and Processing
- Agricultural Resources Management
- Agriculture Supplies and Services
- Animal Production
- Ornamental Horticulture
- Plant Production

The primary function of the Agricultural Education Department is to provide for the preparation of teachers of agriculture and home economics for the public secondary schools of California. Specialized pre-professional and professional courses are offered for undergraduate and graduate students. In addition, the Agricultural Science major provides for professional preparation in agricultural communication. In association with the Brock Center for Agricultural Communications, selected interdisciplinary courses in Journalism, Graphic Communications, and Speech Communications make up the Agricultural Communications career area.

The department offers a Bachelor of Science degree in Agricultural Science with the choice of one of the concentrations listed above and 32 units of adviser approved electives which may be selected in career areas of teaching agriculture, agricultural communications or teaching home economics. The teaching credential preparation program provides for early field experience and professional education coursework in the undergraduate curriculum. Agricultural communications preparation includes a breadth and depth in agriculture, foundations in journalism and an industry internship. The Brock Center for Agricultural Communication provides students with the opportunity for professional preparation in agricultural communication.

Students interested in teaching agriculture may receive a B.S. degree in any of the agricultural science production or management fields. Coursework toward the teaching credential should be started early in order to complete the total curriculum most effectively.

Student teaching is a vital part of the graduate program for agriculture majors. Candidates must complete a minimum of 45 quarter units of postgraduate coursework necessary for the "clear" teaching credential. For more information see Teaching Credential Programs.

Agricultural Education courses may be used to fulfill many of the units required for the Master of Science degree with a specialization in General Agriculture. Detailed information may be obtained in the office of the Dean of the College of Agriculture or in the Agricultural Education Department.

CURRICULAR CONCENTRATIONS

Agricultural Mechanics

A selection of courses designed to develop knowledge and ability necessary to perform agricultural mechanical operations and processes.

Agricultural Products and Processing

A selection of courses concerned with the principles and practices involved in the science and technology of agricultural products.

Agricultural Resources Management

A selection of courses stressing the principles and practices involved in the conservation, multiple use or improvement of natural resources.

Agricultural Supplies and Services

A selection of courses which stresses providing the consumable supplies and services needed in the production phase of agriculture.

Animal Production

A selection of courses stressing principles and practices related to the economic use of resources in the production of livestock and poultry.

Ornamental Horticulture

A selection of courses stressing the principles and practices involved with the culture of plants used for ornamental or aesthetic purposes.

Plant Production

A selection of courses stressing principles and practices related to the economic use of resources in the culture and production of agricultural plants.

B.S. AGRICULTURAL SCIENCE

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

A minimum of 60 units of upper division (300-400 level) coursework is required.

	Units
MAJOR COURSES	
AGED 202 Introduction to Agricultural Education.....	2
AGED 404 Agricultural Leadership	2
AGED 438 Instructional Processes in Agricultural Education	3
AGED 461 Senior Project.....	2
AGED 462 Senior Project.....	3
AE 121 Agricultural Mechanics	2
ASM 141 Agricultural Machinery Safety.....	3
AE 340 Irrigation Water Management.....	4
AGB 201 Agribusiness Sales and Service	3
AGB 301 Agricultural Marketing	3
AGB 321 Farm Records	4
ASCI 231 General Animal Science.....	3
CRSC 230 Agronomic Crop Production	4
DSCI 230 General Dairy Husbandry	4
FRSC 230 California Fruit Growing or VGSC 230 Introduction to Vegetable Science	4
OH 230 Ornamental Gardening.....	3
PM 230 Poultry Industry Survey	3
SS 121 Introductory Soil Science	4
Concentration courses (see below).....	22
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	78
SUPPORT COURSES	
* = Courses satisfy General Education and Breadth requirements	
AG 250 Computer Application to Agriculture (F.1.)* ..	3
BOT 121 General Botany (B.1.b)*	4
CHEM 121 General Chemistry (B.1.a.)*	4
MATH 118 Pre-Calculus Algebra (B.2.)*	4
ZOO 131 General Zoology	4
Life or physical science elective (B.1.)*	3
Adviser approved restricted electives.....	32
20-24 units must be 300-400 level depending on concentration. May be selected from teaching agriculture, agricultural communication, or teaching home economics.	
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	54

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300-400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	3
A minimum of 18 units is required; 15 of the units are in Support	
Life or Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)* see Support Courses	
Mathematics (B.2.)* see Support Courses	
Mathematics/statistics (B.2.)	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300-400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/ECON 211/ECON 222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	0
A minimum of 3 units is required; 3 of the units are in Support	
(F.1.)* see Support Courses	
Total	<hr/>
A minimum of 76 units is required; 19 of the units are in Support	
	58
ELECTIVES	8
	<hr/>
	198

CONCENTRATIONS (select one)**Agricultural Mechanics Concentration**

AE 133 Agricultural Drafting	3
AE 237 Engineering Surveying	2
AE 321 Agricultural Safety	3
ASM 203 Agricultural Systems Analysis	3
IME 155 Industrial Welding Technology	1
AE electives (7 units at 300–400 level)	10

22

Agricultural Products and Processing Concentration

DSCI 231 General Dairy Manufacturing	4
FSN 211 Muscle Food Science	3
FSN 212 Meat Grading and Evaluation	2
VGSC 421 Postharvest Tech. Horticultural Crops	4
DSCI/FSN electives (6 units at 300–400 level)	9

22

Agricultural Resources Management Concentration

CONS 120 Fisheries and Wildlife Management	3
CONS 207 Resource Survey	3
FNR 101 Natural Resources Management and Society	3
FNR 304 Ecology of Resource Areas	4
FNR electives (6 units at 300–400 level)	9

22

Agricultural Supplies and Services Concentration

AGB 101 Introduction to Agribusiness and Agricultural Economics	4
AGB 302 Agricultural Associations and Cooperatives	3
AGB 310 Agribusiness Credit and Finance	3
AGB 406 Agribusiness Marketing Planning	4
AGB electives	8

22

Animal Production Concentration

ASCI 220 Introduction to Animal Nutrition and Feeding	4
ASCI 226 Livestock Evaluation	3
ASCI 476 Issues in Animal Agriculture	3
DSCI 330 Artificial Insemination	3
ASCI/DSCI/PM electives (4 units at 300–400 level) ...	9

22

Ornamental Horticulture Concentration

OH 123 Landscape Installation and Maintenance	2
OH 124 Plant Propagation	4
OH 125 Florist Practices	3
OH 324 Foliage Plant Culture	4
OH electives (6 units at 300–400 level)	9

22

Plant Production Concentration

CRSC 230/FRSC 230/VGSC 230 (Select course not taken in major column)	4
CRSC 221 Weed Science	4
CRSC 311 Insect Pest Management	4
SS 221 Fertilizers	4
CRSC/FRSC/VGSC electives (300–400 level)	6

22

AGRICULTURAL ENGINEERING DEPARTMENT

Agricultural Engineering Bldg. (08), Room 101
(805) 756-2378
(805) 756-2626 (FAX)

Faculty

Department Head, Edgar J. Carnegie

James Bermann	Rollin D. Strohmman
Charles M. Burt	Robert E. Walker
Richard A. Cavaletto	Douglas W. Williams
L. Joe Glass	James B. Zetsche, Jr.
Robin R. Grinnell	Mark A. Zohns
M. Stephen Kaminaka	

Programs

B.S. Agricultural Engineering

B.S. Agricultural Systems Management

The Agricultural Engineering Department offers two programs leading to a Bachelor of Science degree: Agricultural Engineering and Agricultural Systems Management.

Department facilities include well-equipped laboratories for hydraulic systems, evaluation and testing of power units, fabrication of agricultural machinery, agricultural electrical systems, design and construction of agricultural structures, photogrammetry, microcomputers and controllers.

Outdoor facilities include a water delivery unit with multiple pumping systems and operational canals, a field for evaluation of various irrigation systems including an operating linear move and land for experience in the mechanical production of farm products and safe operation of agricultural machinery.

Students are encouraged to participate in the student clubs of the department. The Agricultural Engineering Society is composed of Agricultural Engineering Technology and Agricultural Engineering majors and is involved in a broad range of activities and services including Homecoming displays. The student branch of the American Society of Agricultural Engineers and the Student Mechanization Branch offer an active program of professional and extracurricular activity.

AGRICULTURAL ENGINEERING MAJOR

Agricultural engineers provide the engineering necessary for the development of agriculture and other biological systems. The agricultural engineer represents the most general type of engineer, adept at utilizing electrical and mechanical energy sources and water resources and designing structural units.

The curriculum features a unique combination of engineering and applied science coursework designed to prepare the graduate to assume a productive role in society.

Employment opportunities exist primarily in the design, evaluation and management of systems encompassing irrigation, drainage, hydrology, soil conservation; farm machinery; food processing; and agricultural environments. Manufacturers, consulting engineers, and governmental and private agencies are the primary employers.

The curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

AGRICULTURAL SYSTEMS MANAGEMENT MAJOR

This major gives the student broad agricultural training with a business and management emphasis in eight systems areas. These areas are: plant production, livestock production, food and fiber processing, environmental information management, water/irrigation, and processing and manufacturing. The systems approach in these specialized areas, coupled with interdisciplinary experiences are designed to foster management expertise based upon a core curriculum consisting of 32 units in technology. Some 27 units in business oriented courses serve to provide a firm foundation for the career electives.

Employment opportunities are available in sales and service of equipment and machinery, management and production of animals and crops, processing of food and fiber, management of water/irrigation facilities and equipment in concert with professional engineers, and manufacturing of agricultural mechanization machinery and equipment designed by engineers.

Cal Poly offers a Master of Science degree in Agriculture with a specialization in Agricultural Engineering Technology, a closely related field.

B.S. AGRICULTURAL ENGINEERING

Indented courses to be taken in sequence. For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser. Courses are displayed by year.

	Units
Freshman	
AE 128 Introduction to Fundamentals of Agricultural Technology	3
AE 143 Power and Machinery	4
AE 237 Engineering Surveying I	2
ETME 141 Applied Descriptive Geometry	2
ETME 142 Engineering Drawing I	1
ETMP 144 Manufacturing Processes: Machining I	2
SS 121 Introductory Soil Science	4
CSC 251 Digital Computer Applications (F.1.)	2
ENGL 114 Writing: Exposition (A.1.)	4
ENGL 125/PHIL 125/SPC 125 Critical Thinking (A.2.)	3
MATH 141 Calculus I (B.2.)	4
MATH 142 Calculus II (B.2.)	4
MATH 143 Calculus III (B.2.)	4
PHYS 131 General Physics (B.1.a.)	4
PHYS 132 General Physics (B.1.a.)	4
¹ Critical reading elective (C.1.)	3
	<hr/> 50
Sophomore	
AE 232 Agricultural Structures Planning	3
AE 236 Principles of Irrigation	4
ETME 143 Engineering Drawing II	1
ETWT 144 Manufacturing Processes: Welding	2
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
CHEM 124 General Chemistry (B.1.a.)	4
CHEM 125 General Chemistry (B.1.a.)	4
ECON 201 Survey of Economics or	
ECON 211 Principles of Economics (D.3.)	3
ENGL 218 Professional Writing: Argumentation and Reports (A.4.)	4
PHYS 133 General Physics (B.1.a.)	4
SPC 201 Public Speaking or	
SPC 202 Principles of Speech	
Communication (A.3.)	3
Elective	3
	<hr/> 49

Junior

AE 312 Hydraulics	4
AE 326 Energy Systems for Agriculture	3
AE 328 Measurements and Computer Interfacing	3
AE 331 Irrigation Theory	3
AE 403 Agricultural Systems Engineering	3
AE 430 Finite Element Analysis	3
CE 204 Strength of Materials	3
CE 205, CE 206 Strength of Materials and Laboratory	2,1
EE 311 Electrical Circuit Theory	3
EE 351 Electric Circuits Laboratory	1
IE 314 Engineering Economics	3
ME 302 Thermodynamics	3
STAT 321 Statistical Analysis	3
BIO 220 Physiology and Biological Adaptation (B.1.b., E.2.)	4
PHIL 230/231 Philosophical Classics (C.1.)	3
POLS 210 American and California Government (D.1.)	3
¹ Critical reading elective (C.1.)	3
¹ Fine and performing arts elective (C.2.)	3
	<hr/> 54

Senior

AE 414 Irrigation Engineering	4
AE 415 Hydrology	3
AE 421 Equipment Engineering	4
AE 422 Equipment Engineering	3
AE 427 Agricultural Process Engineering	3
AE 433 Agricultural Structures Design	4
AE 461 Senior Project	2
AE 462 Senior Project	3
AE 464 Professional Practice	3
ANT 201/GEOG 150/SOC 105 (D.4.a.)	3
HIST 204 History of American Ideals and Institutions (D.1.)	3
HIST 315 Modern World History (D.2.)	3
PSY 201/PSY 202 General Psychology (E.1.)	3
¹ ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	3
¹ Arts and humanities elective (Area C)	3
¹ Literature, philosophy, arts elective (300–400 level) (C.3.)	3
Elective	3
	<hr/> 53
	<hr/> 206

¹ To be selected in accordance with the General Education-Breadth requirements. (Please see page 77 of this catalog.)

B.S. AGRICULTURAL ENGINEERING

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

	Units
AE 128 Introduction to Fundamentals of Agricultural Technology.....	3
AE 143 Power and Machinery	4
AE 151 CAD for Agricultural Engineering.....	1
AE 232 Agricultural Structures Planning.....	3
AE 236 Principles of Irrigation.....	4
AE 237 Engineering Surveying I.....	2
AE 312 Hydraulics.....	4
AE 326 Energy Systems for Agriculture	3
AE 328 Measurements and Computer Interfacing	3
AE 331 Irrigation Theory.....	3
AE 403 Agricultural Systems Engineering	3
AE 414 Irrigation Engineering.....	4
AE 415 Hydrology	3
AE 421 Equipment Engineering	4
AE 422 Equipment Engineering	3
AE 427 Agricultural Process Engineering.....	3
AE 430 Finite Element Analysis	3
AE 433 Agricultural Structures Design	4
AE 461 Senior Project.....	2
AE 462 Senior Project.....	3
AE 464 Professional Practice	3
	<hr/> 65

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

BIO 220 Physiology and Biological Adaptation (B.1.b., E.2.)*	4
CE 204 Strength of Materials.....	3
CE 205, 206 Strength of Materials and Lab.....	2,1
CHEM 124 General Chemistry (B.1.a.)*	4
CHEM 125 General Chemistry	4
CSC 118/CSC 204/CSC 251 (F.1.)*	2
EE 201, 251 Electrical Circuit Theory and Lab	3,1
ETME 141 Applied Descriptive Geometry	2
ETME 142 Engineering Drawing I	1
IME 142 Manufacturing Processes: Materials Joining.....	2
IME 143 Manufacturing Processes: Material Removal	2
IME 314 Engineering Economics	3
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II (B.2.)*	4
MATH 143 Calculus III	4
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
ME 302 Thermodynamics	3
PHYS 131 General Physics (B.1.a.)*	4

PHYS 132 General Physics	4
PHYS 133 General Physics	4
SS 121 Introductory Soil Science	4
STAT 321 Statistical Analysis I.....	3

82**GENERAL EDUCATION AND BREADTH**

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 218 (A.4.)	
Area B:	0
A minimum of 18 units is required; 18 of the units are in Support	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)* see Support Courses	
Mathematics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	3
A minimum of 5 units is required; 2 of the units are in Support	
PSY 201/PSY 202 (E.1.)	
(E.2.)* see Support Courses	
Area F	0
A minimum of 2 units is required; 2 of the units are in Support	
(F.1.)* see Support Courses	
Total.....	<hr/> 53
A minimum of 76 units is required; 23 of the units are in Support	

ELECTIVES	6
	<hr/> 206

B.S. AGRICULTURAL SYSTEMS MANAGEMENT

Indented courses to be taken in sequence. For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser. Courses are displayed by year.

Freshman

	Units
AE 128 Introduction to Fundamentals of Agricultural Technology	3
AE 133 Agricultural Drafting	3
ASM 141 Agricultural Machinery Safety	3
ASM 142 Agricultural Power and Machinery Management	4
SS 121 Introductory Soil Science	4
CHEM 121 General Chemistry (B.1.a.)	4
CHEM 122 General Chemistry (B.1.a.)	4
ENGL 114 Writing: Exposition (A.1.)	4
ENGL 125/PHIL 125/SPC 125 Critical Thinking (A.2.)	3
MATH 118 Pre-Calculus Algebra (B.2.)	4
MATH 119 Pre-Calculus Trigonometry	3
Electives	6
	<hr/> 45

Sophomore

ASM 203 Agricultural Systems Analysis	3
ACTG 211 Financial Accounting for Nonbusiness Majors	4
AG 250/CSC 110/CSC 120 (F.1.)	3
AGB 212 Agricultural Economics	3
BIO 220 Physiology and Biological Adaptation (B.1.b., E.2.)	4
ECON 201 Survey of Economics or ECON 211 Principles of Economics (D.3.)	3
ENGL 218 Professional Writing: Argumentation and Reports (A.4.)	4
PHIL 230/PHIL 231 Philosophical Classics (C.1.)	3
PHYS 104 Introduction to Physics (B.1.a.)	4
PSY 201/PSY 202 General Psychology (E.1.)	3
SPC 201 Public Speaking or SPC 202 Principles of Speech Communication (A.3.)	3
Animal or plant production elective	3
Agribusiness electives	4
Electives	3
	<hr/> 47

Junior

ASM 324 Principles of Agricultural Electrification	4
ASM 325 Agricultural Energy Systems	3
AE 321 Agricultural Safety	3
AE 340 Irrigation Water Management	4
AGB 301 Agricultural Marketing	3
AGB 310 Agricultural Credit and Finance	3
ANT 201/GEOG 150/SOC 105 (D.4.a.)	3
HIST 204 History of American Ideals and Institutions (D.1.)	3
Adviser approved electives	10
Agribusiness electives	6
² Critical reading electives (C.1.)	6
	<hr/> 48

Senior

AE 402 Agricultural Materials Science	3
AE 425 Computer Controls for Agriculture	3
ASM 432 Agricultural Buildings	4
ASM 463 Undergraduate Seminar	1
¹ Senior project 461, 462	2,3
AGB 401 Managing Cultural Diversity in Agricultural Labor Relations	4
HIST 315 Modern World History (D.2.)	3
POLS 210 American and California Government (D.1.)	3
² ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	3
² Arts and humanities elective (Area C)	3
² Fine and performing arts elective (C.2.)	3
² Literature, philosophy, arts elective (300–400 level) (C.3.)	3
Adviser approved electives	9
	<hr/> 47
	<hr/> 187

¹ Senior project to be taken in emphasis area.

² To be selected in accordance with the General Education-Breadth requirements. (Please see page 77 of this catalog.)

B.S. AGRICULTURAL SYSTEMS MANAGEMENT

Courses are displayed by Major, Support, General Education and Breadth, and Electives. 60 units must be 300-400 level.

	Units
MAJOR COURSES	
ASM 141 Agricultural Machinery Safety.....	3
ASM 142 Agricultural Power and Machinery Management	4
ASM 203 Agricultural Systems Analysis	3
ASM 324 Principles of Agricultural Electrification	4
ASM 325 Agricultural Energy Systems	3
AE 340 Irrigation Water Management.....	4
ASM 402 Agricultural Materials	3
AE 425 Computer Controls for Agriculture.....	3
ASM 432 Agricultural Buildings	4
ASM 463 Undergraduate Seminar.....	1
¹ Senior Project 461, 462.....	2,3
Adviser approved electives	19
May be selected from the following emphasis areas: plant production, livestock production, food processing, environment information management, water/irrigation, agricultural waste management, process and manufacturing, or teaching agriculture	
	56
SUPPORT COURSES	
* = Courses satisfy General Education and Breadth requirements.	
AE 128 Introduction to Fundamentals of Agricultural Technology	3
AE 133 Agricultural Drafting	3
AE 321 Agricultural Safety.....	3
ACTG 211 Financial Accounting for Nonbusiness Majors.....	4
AG 250 Computer Application in Agriculture (F.1.)*	3
AGB 212 Agricultural Economics	3
AGB 301 Agricultural Marketing	3
AGB 310 Agricultural Credit and Finance	3
AGB 401 Agribusiness Labor Relations and Personnel Management	4
BIO 220 Physiology and Biological Adaptation (B.1.b., E.2.)*	4
CHEM 121 General Chemistry (B.1.a.)*	4
CHEM 122 General Chemistry (B.1.a.)*	4
MATH 118 Pre-Calculus Algebra (B.2.)*	4
MATH 119 Pre-Calculus Trigonometry	3
PHYS 104 Introduction to Physics (B.1.a.)*	4
SS 121 Introductory Soil Science	4
Units selected by the student and approved in advance by the Agribusiness Department Minor Coordinator.....	10
Animal or plant production course.....	3
	69

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300-400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 218 (A.4.)	
Area B:	0
A minimum of 18 units is required; 18 of the units are in Support	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)* see Support Courses	
Mathematics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300-400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)	
Area E:	3
A minimum of 5 units is required; 2 of the units are in Support	
PSY 201/PSY 202 (E.1.)	
(E.2.)* see Support Courses	
Area F:	0
A minimum of 3 units is required; 3 of the units are in Support	
(F.1.)* see Support Courses	
Total.....	53
A minimum of 76 units is required; 23 of the units are in Support	
ELECTIVES	9
	187

¹ Senior project may be taken in emphasis areas.

ANIMAL SCIENCE DEPARTMENT

Agriculture Bldg. (10), Room 101
(805) 756-2419

Faculty

Interim Department Head, Phillip M. Doub

Gene A. Armstrong	William E. Plummer
M. Steven Daugherty	Robert T. Rutherford
James R. Flanagan	Kenneth C. Scotto
Michael H. Hall	Dale A. Smith
Roger M. Hunt	Robert Spiller
Michael W. Lund	Clifford A. Stokes
Roland K. Pautz	

Programs

B.S. Animal Science

Poultry Management Minor

The Bachelor of Science degree in Animal Science prepares students for many career opportunities. The major coursework combines theory and practical applications for all of the species common to the livestock and poultry industries. In consultation with their faculty advisers, students select electives according to the student's career goals. The adviser approved electives are designed to provide students with curriculum flexibility and choice. Students may select coursework in one of the following areas: livestock production, poultry management, agribusiness, meats/muscle science, teaching agriculture, agricultural communication, resource management, and pre-veterinary/graduate school.

In addition, the department offers a wide assortment of extra- and co-curricular activities including four different student clubs and a nationally competitive livestock judging team. Students also are involved in organizing and conducting special meetings, seminars and field days sponsored by the department.

The department maintains herds or flocks of beef cattle, sheep, swine, horses and poultry. Some of the nation's most noted bloodlines can be found within the registered breeds on campus, including some which have arrived via embryo transfer and artificial insemination. By actively participating in the management of the herds and flocks, students simulate the larger scale operations of the industry. The enterprise project system is another valuable experience for students.

In addition, the department has an active role in the developing management of the Swanton-Pacific Ranch in Davenport, California. The Animal Science Department is taking the lead on development of environmentally sound resource management practices including intensive

controlled grazing, multiple species grazing and using the grazing animal as a tool to enhance the total environment of the ranch.

POULTRY MANAGEMENT MINOR

The Poultry Management minor prepares students for a wide variety of positions in the commercial poultry industry and in many allied services related directly to the industry. Opportunities in the industry are many and varied as evidenced by the fact that graduates have worked in more than fifty types of jobs in the industry.

Poultry students have an opportunity to conduct enterprise projects in the production of market eggs, hatching eggs, meat birds, replacement pullets, turkey, and game birds, which give them valuable experience in production techniques as well as exposure to a number of business activities related to production. Advanced students may have opportunities to study special topics related to problems in management of commercial poultry flocks.

The university has facilities for more than 5,000 adult and over 6,000 growing chickens on approximately 10 acres of land. The poultry unit maintains flocks of a number of breeds and varieties of chickens for both egg and meat production. Flocks of turkeys and several game bird species are maintained in support of the instructional program. A 15,000-egg capacity hatchery is equipped to hatch eggs ranging in size from quail to turkey. A well-equipped poultry processing plant and egg handling and processing facility enables students to gain experience in these areas.

	<i>Units</i>
Required courses	20
PM 230 Poultry Industry Survey (3)	
PM 240 Poultry Business Management (3)	
PM 250 Poultry Processing (3)	
PM 330 Poultry Production Management (4)	
PM 340 Poultry Anatomy, Physiology and Diseases (4)	
PM 350 Applied Poultry Feeding and Nutrition (3)	
Electives	8
To be chosen from:	
ACTG 211; AG 339; AGB 310; ENGL 310;	
MKTG 301; FSN 331, 333, 336, 431;	
PM 290/490, 360	

B.S. ANIMAL SCIENCE

Courses are displayed by Major, Support, General Education and Breadth, and Electives. 60 units must be 300-400 level.

MAJOR COURSES

	Units
ASCI 101 Introduction to the Animal Sciences	2
ASCI 141 Market Beef Production.....	4
ASCI 142 Swine Science.....	4
ASCI 143 Systems of Sheep Production	4
ASCI 144 Equine Science.....	3
ASCI 220 Intro. Animal Nutrition and Feeding	4
ASCI 304 Animal Breeding.....	3
ASCI 401 Reproductive Physiology	4
ASCI 420 Animal Nutrition or ASCI 421 Animal Nutrition (Pre-Veterinary/Graduate Students)	3
ASCI 461 Senior Project.....	2
ASCI 462 Senior Project.....	2
ASCI 463 Undergraduate Seminar	2
ASCI 476 Issues in Animal Agriculture.....	3
FSN 211 Meats	3
PM 230 Poultry Industry Survey	3
VS 123 Anatomy and Physiology.....	3
Select two of the following: ASCI 311, 312, 313, 314; PM 320, 340.....	6
Adviser approved electives.....	35
19 units must be 300-400 level. May be selected from: livestock production, poultry management, agribusiness, meats/muscle science, teaching agriculture, agricultural communication, resource management, and pre-veterinary/graduate school.	
	<hr/> 90

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

BIO 151 Introduction to Biology or BIO 101 General Biology and BIO 105 General Biology Laboratory (B.1.b.)*	4
BIO 303 Genetics (B.1.b.)*	3
CHEM 121/127 General Chemistry (B.1.a.)*.....	4
CHEM 122/128 General Chemistry	4
CHEM 316 Organic Chemistry or CHEM 326 Survey of Organic Chemistry	4
	<hr/> 19

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300-400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215 or 218 (A.4.)	

Area B:	6
A minimum of 18 units is required; 12 of the units are in Support	
Physical and life sciences (B.1.a., B.1.b.)* see Support Courses	
Mathematics elective (B.2.)	
Mathematics or statistics elective (B.2.)	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300-400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	3
Computer literacy elective (F.1.)	
Total.....	<hr/> 64
A minimum of 76 units is required; 12 of the units are in Support	
ELECTIVES	13
	<hr/> 186

CROP SCIENCE DEPARTMENT

**Agricultural Sciences Bldg. (11), Room 229
(805) 756-1237**

Faculty

Department Head, George G. Gowgani

Edgar H. Beyer	Wesley J. Mueller
J. Wyatt Brown	Gene P. Offermann
Lark P. Carter	John C. Phillips
A. Charles Crabb	Edwin C. Seim
H. Paul Fountain	Mark D. Shelton
James S. W. Greil	Brenda S. Smith
Louis W. Harper	David L. Warfield
Robert J. McNeil	Jo Ann C. Wheatley

Programs

B.S. Crop Science

B.S. Fruit Science

B.S. Plant Protection Science

Plant Protection Minor

Three major curricula leading to the Bachelor of Science degree are offered by the Crop Science Department and are designed to prepare students for many career opportunities. In consultation with faculty advisers, students majoring in Crop Science or Fruit Science select electives according to their career goals. These adviser-approved electives are designed to provide students with curriculum flexibility and choice. Students may select coursework in one of the following areas: crop production management, orchard and vineyard management, postharvest technology-marketing, crop science/vegetable science, pomology, enology, crop ecology, agricultural chemistry, applied biotechnology, and agricultural communications.

The department has 70 acres of productive citrus, avocados, grapes, deciduous orchard, and berries with over 100 varieties represented. Additional nonbearing acreage for instructional use exists and new plantings are under way. About 400 acres are devoted to student production enterprises in field and vegetable crops. An additional 200 acres of campus farm crop land provide opportunities to gain experience through part-time employment. All departmental majors are encouraged to gain experience and earn income by participation in the enterprise project program or by working for the campus farm.

The technological phases of instruction are enhanced by packing and grading equipment, seed processing equipment, a pesticide application and rinsate recycling system, and specialized laboratory equipment for the study of various

crops. Field trips supplement instruction for crops not common to the San Luis Obispo area.

The Crop Science Department has an active role in the management of the Swanton-Pacific Ranch in Davenport, California. Students are able to intern on this working ranch while concurrently taking university courses offered from the San Luis Obispo campus through distance-learning technology. The ranch offers experiences in managing crops, livestock, forests and range land.

The department supports extra- and co-curricular activities for its students. These include two student clubs and a team which competes in national crops-judging contests.

CROP SCIENCE MAJOR

The Crop Science major qualifies graduates for private or corporate crop production and management, sales and service, positions with commercial pest control firms, government regulatory agencies, and agriculturally related organizations, and as agronomists and horticulturists with government or industry.

FRUIT SCIENCE MAJOR

The Fruit Science major qualifies graduates for orchard or vineyard management or for related employment in packing houses, cooperatives, canneries, sales and service businesses, pest control firms, government regulatory agencies, fruit tree nurseries, research stations, and produce-marketing companies. Instruction includes deciduous fruits, nut crops, citrus, avocados, grapes, berries, tropical and subtropical fruits, and minor fruit species.

PLANT PROTECTION SCIENCE MAJOR

Plant Protection Science is a multi-faceted discipline requiring knowledge of pest and beneficial organism biology as well as an understanding of crop production principles, ecology, biotechnology, pesticide toxicology, and environmental science. Plant protection specialists work with crop producers, the ornamental and turf industry, forestry, and livestock producers to reduce pest problems. As environmental regulations increase, employment opportunities grow for people holding professional licenses. The major prepares students to pass all categories of the California Pest Control Advisors License exam.

B.S. CROP SCIENCE

Courses are displayed by Major, Support, General Education and Breadth, and Electives. 60 units must be 300-400 level.

MAJOR COURSES

	Units
CRSC 101 Orientation to Crop Science.....	1
CRSC 131 Introduction to Crop Science	4
CRSC 132 Cereal Grain Production	4
CRSC 133 Row Crop Production	4
CRSC 202/VGSC 202 Enterprise Project.....	3
CRSC 221 Weed Science.....	4
CRSC 304 Plant Improvement.....	4
CRSC 311 Insect Pest Management.....	4
CRSC 411 Experimental Techniques and Analysis	4
CRSC 445 Cropping Systems	4
CRSC 461 Senior Project.....	3
CRSC 462 Senior Project.....	3
CRSC 463 Undergraduate Seminar	2
VGSC 232 California Vegetable Production.....	4
Select either agronomy or vegetable production	12

Agronomy:

- CRSC 231 Commercial Seed Production and Conditioning (4)
- CRSC 330 Advanced Forage Crop Production (4)
- CRSC 421 Oil and Fiber Crops (4)

Vegetable production:

- CRSC 333 Greenhouse Vegetable Production (4)
- VGSC 423 Advanced Vegetable Science (4)
- VGSC 424 Vegetable Crop Management (4)

SUPPORT COURSES

* = Courses satisfy GEB.

BIO 303 Genetics (B.1.b.)*	3
BOT 121 General Botany (B.1.b.)*	4
CHEM 121 General Chemistry (B.1.a.)*	4
FRSC 230 California Fruit Growing	4
MATH 118 Pre-Calculus Algebra (B.2.)*	4
(MATH 116 & 117 will substitute)	
STAT 211 Elementary Probability and Statistics (B.2.)*	3
SS 121 Introductory Soil Science	4
Adviser-approved electives	36

Must include at least 8 units of BIO/BOT/CHEM electives. 12-16 units must be 300-400 level. Areas may include agricultural chemistry, agricultural communications, applied biotechnology, crop ecology, production management, post-harvest technology/marketing, crop science/vegetable science. May not include Enterprise Projects.

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300-400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215 or 218 (A.4.)	

Area B:	0
A minimum of 18 units is required; 18 of the units are in Support	
Physical sciences (B.1.a.)* see Support Courses	
Life sciences (B.1.b.)* see Support Courses	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Lit, phil, arts elective (300-400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F: AG 250 (F.1.)	3
Total.....	58
A minimum of 76 units is required, 18 of the units are in Support.	

ELECTIVES..... 9

189

Recommended Sequence: Major and Support Courses

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
Fall	Winter	Spring
CRSC 101	CRSC 132	CRSC 133
CRSC 131	MATH 118	SS 121
BOT 121	CHEM 121	
2nd Year		
Fall	Winter	Spring
CRSC 221	FRSC 230	VGSC 232
BIO/BOT/CHEM elective	BIO/BOT/CHEM elective	STAT 211
CRSC/VGSC 202		
3rd Year		
Fall	Winter	Spring
BIO 303	CRSC 461	CRSC 304
CRSC 411	CRSC 231 or VGSC 423	CRSC 311
		CRSC 330 or VGSC 424
4th Year		
Fall	Winter	Spring
CRSC 462	CRSC 445	CRSC 463
CRSC 333 or CRSC 421		

B.S. FRUIT SCIENCE

Courses are displayed by Major, Support, General Education and Breadth, and Electives. 60 units must be 300-400 level.

MAJOR COURSES

	Units
CRSC 101 Orientation to Crop Science.....	1
CRSC 221 Weed Science.....	4
CRSC 311 Insect Pest Management.....	4
CRSC 411 Experimental Techniques and Analysis	4
CRSC/FRSC 422 Tropical Crop, Fruit & Nut Production	4
CRSC 461 Senior Project.....	3
CRSC 462 Senior Project.....	3
CRSC 463 Undergraduate Seminar	2
FRSC 131, FRSC 132, FRSC 133 Pomology.....	4,4,4
FRSC 202 Enterprise Project	6
FRSC 231 Viticulture.....	4
FRSC 331 Advanced Viticulture	4
FRSC 332 Fruit Plant Propagation	4
FRSC 342 Citrus and Avocado Fruit Production	4
FRSC/VGSC 421 Postharvest Technology of Horticultural Crops	4
FRSC 436 Advanced Production Problems	4
	<hr/> 67

SUPPORT COURSES * = Courses satisfy GEB

BIO 303 Genetics (B.1.b.)*	3
BOT 121 General Botany (B.1.b.)*	4
CHEM 121 General Chemistry (B.1.a.)*	4
CRSC 230 Agronomic Crop Production or VGSC 230 Introduction to Vegetable Science.....	4
MATH 118 Pre-Calculus Algebra (B.2.)*	4
(MATH 116 & 117 will substitute)	
STAT 211 Elementary Probability and Statistics (B.2.)*	3
SS 121 Introductory Soil Science	4
Adviser-approved electives	31
Must include at least 8 units of BIO/BOT/CHEM electives. 8 units must be 300-400 level. Areas may include agricultural chemistry, agricultural communications, applied biotechnol-ogy, crop ecology, enology, orchard and vineyard management, pomology, postharvest technology/ marketing. May not include Enterprise Projects.	<hr/> 57

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300-400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215 or 218 (A.4.)	

Area B:	0
A minimum of 18 units is required; 18 of the units are in Support	
Physical sciences (B.1.a.)* see Support Courses	
Life sciences (B.1.b.)* see Support Courses	
Mathematics/statistics (B.2.)*see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Lit, phil, arts elective (300-400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:.....	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F: AG 250 (F.1.)	3
Total.....	<hr/> 58
A minimum of 76 units is required, 18 units are in Support	

ELECTIVES	9
	<hr/> 191

Recommended Sequence: Major and Support Courses

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
Fall	Winter	Spring
FRSC 131	FRSC 132	FRSC 133
CRSC 101	MATH 118	
BOT 121	CHEM 121	SS 121
2nd Year		
Fall	Winter	Spring
FRSC 231	FRSC 331	FRSC 342
FRSC 202	FRSC 202	FRSC 202
CRSC 221	STAT 211	CRSC 411
BIO/BOT/CHEM elective	BIO/BOT/CHEM elective	BIO 303
3rd Year		
Fall	Winter	Spring
FRSC 421	FRSC 422	FRSC 332
CRSC 461		CRSC 311
4th Year		
Fall	Winter	Spring
CRSC 230 or VGSC 230		FRSC 436
	CRSC 462	CRSC 463

B.S. PLANT PROTECTION SCIENCE

Courses are displayed by Major, Support, General Education and Breadth, and Electives. 60 units must be 300-400 level.

MAJOR COURSES

	Units
CRSC 101 Orientation to Crop Science.....	1
CRSC/FRSC/VGSC 202 Enterprise Project.....	3
CRSC 221 Weed Science.....	4
CRSC 304 Plant Improvement.....	4
CRSC 311 Insect Pest Management.....	4
CRSC 410 Crop Physiology	4
CRSC 411 Experimental Techniques and Analysis ...	4
CRSC 461 Senior Project.....	3
CRSC 462 Senior Project.....	3
CRSC 463 Undergraduate Seminar	2
Production Courses. Select one of the following sequences.....	16
CRSC 131, 132, 133; FRSC 230	
FRSC 131, 132, 133; CRSC/VGSC 230	
FRSC 131, 231, 342; CRSC/VGSC 230	
Advanced Plant Protection electives	
to be selected from: CRSC 327, 405, 431, 441	12

60

SUPPORT COURSES * = Courses satisfy GEB.

BIO 303 Genetics (B.1.b.)*	3
BIO 325 General Ecology (B.1.b.)*	4
BOT 121 General Botany (B.1.b.)*	4
BOT 323 Plant Pathology.....	4
CHEM 121 General Chemistry (B.1.a.)*	4
CHEM 122 General Chemistry (B.1.a.)*	4
CHEM 326 Survey of Organic Chemistry (B.1.a.)	4
CHEM 328 Biochemistry.....	4
MATH 118 Pre-Calculus Algebra (B.2.)*	4
(MATH 116 & 117 will substitute)	
SS 121 Introductory Soil Science	4
STAT 211 Elementary Probability and Statistics (B.2)*	3
ZOO 131 General Zoology	4
ZOO 335 General Entomology	4
Adviser approved electives.....	9

59

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300-400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215 or 218 (A.4.)	

Area B:	0
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A minimum of 18 units is required; 18 of the units are in Support

Physical sciences (B.1.a.)* see Support Courses

Life sciences (B.1.b.)* see Support Courses

Mathematics/statistics (B.2.)*see Support Courses

Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Lit, phil, arts elective (300-400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective	
(300-400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F: AG 250 (F.1.)	3
Total.....	58
A minimum of 76 units is required; 18 of the units are in Support	
ELECTIVES.....	9

186

Recommended Sequence: Major and Support Courses

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
Fall	Winter	Spring
CRSC 101		
Production Course	Production Course	Production Course
BOT 121	ZOO 131	
	CHEM 121	CHEM 122
2nd Year		
Fall	Winter	Spring
Production Course		
CRSC 221		BOT 323
ZOO 335	CHEM 326	CHEM 328
3rd Year		
Fall	Winter	Spring
CRSC 311	CRSC 405	CRSC 304
CRSC 411	BIO 303	CRSC 461
		SS 121
4th Year		
Fall	Winter	Spring
CRSC 441	CRSC 410	CRSC 463
CRSC 462	CRSC 431	
BIO 325		

PLANT PROTECTION MINOR

This program emphasizes both plant protection and plant production. Within the plant protection field of study, the student will be exposed to a broad range of pest management subjects including entomology, plant pathology, and weed control. Within the production area the student may emphasize fruit production, crop production, ornamental horticulture, or natural resource management.

Required courses	Units 12
<i>Courses used to fulfill requirements of the major cannot also be counted for the minor. Advanced versions of the following courses may be substituted by production majors.</i>	
BOT 323 Plant Pathology or BOT 324 Ornamental and Forest Pathology (4)	
CRSC 221 Weed Control (4)	
CRSC 311 Insect Pest Management (4)	

Courses in area of emphasis	Units 16
<i>For purposes of this minor, plant production majors include Crop Science, Fruit Science, Forestry and Natural Resources (Forestry Concentration) and Ornamental Horticulture majors. Students must select an Emphasis I or Emphasis II based on their major.</i>	

I. Emphasis for Plant Production Majors (minimum of 16 units)

Select four of the following:

- BOT 322 Plant Physiology (4)
- BOT 325 Plant Nematology (4)
- BOT 431 Advanced Plant Pathology (4)
- CRSC 327 Vertebrate Pest Management (4)
- CRSC 405 Advanced Weed Science (4)
- CRSC 410 Crop Physiology (4)
- CRSC 431 Advanced Insect Pest Management (4)
- CRSC 441 Biological Control of Insects (4)
- FNR 303 Forest Protection (5)
- ZOO 335 General Entomology (4)

OR:

II. Emphasis for Non-Plant Production Majors (minimum of 16 units)

A. Select one of the groups below (12 units):

- CRSC 131 Introduction to Crop Science (4)
- CRSC 132 Cereal Grain Production (4)
- CRSC 421 Oil and Fiber Crops (4)
- FRSC 131 Pomology (4)
- FRSC 231 Viticulture (4)
- FRSC 342 Citrus and Avocado Fruit Production (4)
- CRSC 131 Introduction to Crop Science (4)
- VGSC 232 California Vegetable Production (4)
- VGSC 423 Advanced Vegetable Science (4)

- OH 121 Fundamentals Ornamental Horticulture I (4)
- OH 124 Plant Propagation, Fundamentals III (4) or
- OH 243 Turf Management (4)
- OH 324 Foliage Plant Culture (4) or
- OH 424 Nursery Crop Production (4)
- FNR 201 Forest Resources (3)
- FNR 204 Resource Fire Control (2)
- FNR 208 Dendrology (4)
- FNR 305 Forest Harvesting (3)

AND

B. Select one course from Section I: Plant Production Majors (4 units)

Total units for the minor:	<u>28</u>
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DAIRY SCIENCE DEPARTMENT

**Agriculture Bldg. (10), Room 140
(805) 756-2560**

Faculty

Department Head, Edwin H. Jaster

Leslie S. Ferreira
William T. Gillis
Stanley L. Henderson
Gary D. Reif

Dairy Products Technology Center:

Phillip S. Tong, Director
Nana Y. Farkye

Program

B.S. Dairy Science

The Bachelor of Science degree in Dairy Science is designed to prepare students for employment in the various phases of the dairy industry, as well as related fields. All students within the major take a common core of courses and, with adviser approval, select additional courses in an area of interest, which may include: dairy farm or plant management, processing technology, agriculture communication, management, preparation for graduate school, and agriculture teaching.

Excellent facilities are provided for students. The dairy herd includes purebred Jerseys and Holsteins, located on a well-planned unit, where feeding, milking, calf raising, artificial insemination, and management are carried out. The campus creamery is well-equipped with modern processing equipment. Students are employed on a part-time basis to work in both the production and processing areas. A student dairy herd provides an opportunity for students with dairy projects. This farm accommodates 80–100 head of project cattle owned and cared for by students. There are two, six-unit dormitories at this project farm.

The Dairy Products Technology Center (DPTC) focuses on multidisciplinary dairy foods research and training activities designed to support the dairy industry and consumers of dairy products. Current research areas are: cheese chemistry and technology, bioseparation processes, and new product and process development. The Center has state-of-the-art research and development facilities. Students may conduct dairy foods related research projects under the guidance of DPTC faculty. Opportunities also exist to work on joint projects with the University of California-Davis.

GRADUATE PROGRAM

Cal Poly offers a Master of Science degree in Agriculture with a specialization in Dairy Products Technology. Please refer to the M.S. Agriculture section of the College of Agriculture.

186

FOOD SCIENCE AND NUTRITION DEPARTMENT

**Agricultural Sciences Bldg. (11), Room 212
(805) 756-2660**

Faculty

Department Head, Joseph Montecalvo, Jr.

Connie Breazeale	Krishnakumar (Kris) S. Morey
Sarah E. Burroughs	O. Robert Noyes
Madoka Dawson	Mary E. Pedersen
Brian C. Hampson	Robert D. Vance
Hany M. Khalil	Rudy A. Wooten
Kathleen A. McBurney	

Programs

B.S. Food Science

B.S. Nutritional Science

Food Science Minor

Nutritional Science Minor

The Food Science and Nutrition Department offers two degree programs designed to prepare graduates for employment in the general areas of human nutrition and commercial food processing. Graduates in Nutritional Science find rewarding health service careers in hospitals, business, industrial plants, government institutions and education. Food Science graduates take responsible positions in commercial food processing and manufacturing, sales, services and government regulation. Opportunities for private consulting and business are available to graduates in both majors, depending on personal interests and initiative. The department also offers minors in Food Science and Nutritional Science.

The department is equipped with a food processing operations pilot plant and meat processing facilities. The laboratories are designed for teaching courses in nutrition, food service management, sensory evaluation, functional components of foods, and quality control as well as other food processing systems. Classroom and laboratory instruction is personalized as much as possible, and faculty adhere to the university's learn-by-doing philosophy.

Through the student enterprise program, students can manufacture and market various food products. Enterprise projects are designed to simulate industry and business practices. Students are further encouraged to gain industry experience by working during the summer months or by participating in one of the university co-op or internship programs.

There are two departmental clubs—Nutrition Club and Food Science Club. Club activities involve a wide range of social, professional and service projects. Clubs provide opportunity for leadership training and participation in professional societies and organizations.

Graduate Program

Cal Poly offers a Master of Science degree in Agriculture with a specialization in Food Science and Nutrition. Please refer to the M.S. Agriculture section of the College of Agriculture.

Packaging Minor

For information regarding the Packaging Minor, please see the Industrial Technology Department.

FOOD SCIENCE MAJOR

The Bachelor of Science degree in Food Science is designed to prepare students for employment in the commercial food processing industry. Principal areas of instruction are in fruit and vegetable processing, cereal and snack food manufacture and red meat processing. Instruction qualifies graduates for careers in line production, quality control, food technology, marketing and management. The curriculum is approved by and is in compliance with minimum standards established by the Institute of Food Technologists, an international scientific society.

NUTRITIONAL SCIENCE MAJOR

The Nutritional Science curriculum prepares graduates for careers in various areas of nutrition, dietetics, and food administration. The Bachelor of Science degree program in Nutritional Science is an American Dietetic Association-approved didactic program in dietetics and fulfills the academic requirements for eligibility for admission to a dietetic internship or equivalency which must be completed before qualifying for registration as a dietitian with the American Dietetic Association. Hospitals, educational institutions, governmental agencies, and industry employ graduates with positions in food systems management, nutrition services and education. Graduates are also prepared to pursue advanced degrees in nutrition, foods, dietetics, public health and institution management.

B.S. FOOD SCIENCE

Courses are displayed by Major, Support, General Education and Breadth, and Electives. 60 units must be 300-400 level.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements.

FSN 101 Orientation to Food Science and Nutrition .	1
FSN 170 Introductory Food Science.....	4
FSN 210 Nutrition (E.2.)*	3
FSN 209 Procurement and Use of Muscle Foods or 211 Muscle Food Science.....	3
FSN 217 Fundamentals of Food Processing Operations	4
FSN 301 Unit Processing Operations I.....	4
FSN 302 Unit Processing Operations II.....	4
FSN 331 Principles of Food Plant Sanitation	3
FSN 332 Statistical Quality Control	3
FSN 333 Quality Assurance in Food Industries.....	4
FSN 336 Food Packaging.....	3
FSN 338 Further Processing of Muscle Foods	3
FSN 339 Cereal Science and Processing.....	3
FSN 407 Food Composition Science	4
FSN 409 Sensory Evaluation of Food.....	4
FSN 431 Advanced Muscle Food Science.....	3
FSN 435 Food Engineering.....	4
FSN 436 Food Laws and Regulations	3
FSN 437 Advanced Food Processing.....	4
FSN 461 Senior Project.....	3
FSN 462 Senior Project.....	3
FSN 463 Undergraduate Seminar	2

Units

72

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

AG 250 Computer Applications in Agriculture (F.1.)*.....	3
BACT 221 General Bacteriology (B.1.b.)*	4
BACT 421 Food Microbiology	4
CHEM 121 General Chemistry (B.1.a.)*	4
CHEM 122 General Chemistry (B.1.a.)*	4
CHEM 326 Survey of Organic Chemistry	4
CHEM 328 Biochemistry.....	4
CHEM 435 Food Analysis	4
DSCI 231 General Dairy Manufacturing	4
¹ MATH 118 Pre-Calculus Algebra (B.2.)*	4
PHYS 104 Introductory Physics (B.1.a.)*	4
STAT 211 Elementary Probability and Statistics (B.2.)*	3
Animal science adviser approved elective.....	4
Business adviser approved elective	3
Plant science adviser approved elective.....	4
Adviser approved electives.....	7

64

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300-400 level. Additional GEB courses are listed under Major and Support courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215 or 218 (A.4.)	
Area B	0
A minimum of 18 units is required; 18 of the units are in Support	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)* see Support Courses	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300-400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)	
Area E:	3
A minimum of 5 units is required; 2 of the units are in Major	
PSY 201/PSY 202 (E.1.)	
(E.2.)* see Major Courses	
Area F.....	0
A minimum of 3 units are required, 3 of the units are in Support	
Computer literacy (F.1.)* see Support Courses	
Total.....	53
A minimum of 76 units is required; 23 of the units are in Major and Support	

ELECTIVES.....	9
	198

¹ MATH 116 and 117 will substitute for MATH 118 and are taught at a slower pace for those who need more review. MATH 117 will satisfy GEB area B.2.

B.S. Food Science**Recommended Sequence: Major and Support Courses**

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
Fall	Winter	Spring
FSN 101	FSN 210	FSN 209/211
FSN 170		
MATH 118	CHEM 121	AG 250
	PHYS 104	CHEM 122
2nd Year		
Fall	Winter	Spring
FSN 217	FSN 301	FSN 302
BACT 221	CHEM 328	ASCI Elec.
CHEM 326	DSCI 231	BUS Elec.
	STAT 211	
3rd Year		
Fall	Winter	Spring
FSN 332	FSN 333	FSN 331
FSN 338	FSN 339	FSN 336
		FSN 431
BACT 421	CHEM 435	
Plant Sci Elec.		
4th Year		
Fall	Winter	Spring
FSN 409	FSN 435	FSN 437
FSN 463	FSN 436	FSN 407
	FSN 461	FSN 462
Approved Elec.		

B.S. Nutritional Science**Recommended Sequence: Major and Support Courses**

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
Fall	Winter	Spring
FSN 101	FSN 121	FSN 230
FSN 210		
CHEM 121	AG 250/CSC 110	ANT 201
SOC 105	CHEM 122	MATH 118
	ZOO 131	ZOO 237
2nd Year		
Fall	Winter	Spring
FSN 209		FSN 310
CHEM 326	CHEM 328	ACTG 211
MGT 206	STAT 211	ECON 201
	ZOO 331	ZOO 332
3rd Year		
Fall	Winter	Spring
FSN 321	FSN 315	FSN 344
FSN 328	FSN 329	FSN 412
	FSN 343	
EDUC 305	BACT 221	MGT 314
	MGT 312	
4th Year		
Fall	Winter	Spring
FSN 415	FSN 416	FSN 461
FSN 429	FSN 426	
FSN 463	FSN 430	
		BACT 421

B.S. NUTRITIONAL SCIENCE

Courses are displayed by Major, Support, General Education and Breadth, and Electives. 60 units must be 300-400 level.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements.

FSN 101 Orientation to Food Science and Nutrition .	1
FSN 121 Fundamentals of Food	4
FSN 209 Procurement and Use of Muscle Foods	3
FSN 210 Nutrition (E.2.)*	3
FSN 230 Elements of Food Processing	4
FSN 310 Maternal and Child Nutrition	3
FSN 315 Nutrition in Aging	3
FSN 321 Meal Management	3
FSN 328 Advanced Nutrition I	3
FSN 329 Advanced Nutrition II	3
FSN343 Institutional Foodservice I	3
FSN 344 Institutional Foodservice II	3
FSN 412 Experimental Nutrition	2
FSN 415 Methods of Teaching Nutrition	3
FSN 416 Community Nutrition	3
FSN 426 Food Systems Management	3
FSN 429 Diet Therapy I	3
FSN 430 Diet Therapy II	3
FSN 461 Senior Project	3
FSN 463 Undergraduate Seminar	2

Units

58

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

ACTG 211 Financial Accounting for Nonbusiness Majors	4
AG 250 Computer Application to Agriculture or CSC 110 Computers and Computer Applications: MS-DOS (F.1.)*	3
ANT 201 Cultural Anthropology	3
BACT 221 General Bacteriology	4
BACT 421 Food Microbiology	4
CHEM 121 General Chemistry (B.1.a.)*	4
CHEM 122 General Chemistry (B.1.a.)*	4
CHEM 326 Survey of Organic Chemistry	4
CHEM 328 Biochemistry	4
ECON 201 Survey of Economics (D.3.)*	3
EDUC 305 Teaching and Learning Processes	3
¹ MATH 118 Pre-Calculus Algebra (B.2.)*	4
MGT 206 Principles of Purchasing	3
MGT 312 Organization and Management Theory	4
MGT 314 Human Resources Management	4
SOC 105 Introduction to Sociology (D.4.a.)*	3
STAT 211 Elementary Probability and Statistics (B.2)*	3
ZOO 131 General Zoology (B.1.b.)*	4
ZOO 237 Human Anatomy	3

ZOO 331 Human Physiology I	3
ZOO 332 Human Physiology II	3

74

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300-400 level.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	0
A minimum of 18 units is required; 18 of the units are in Support	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)* see Support Courses	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300-400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	12
A minimum of 18 is required, 6 of the units are in Support	
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
Economics (D.3.)* see Support Courses	
ANT/GEOG/SOC (D.4.a.)* see Support Courses	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)	
Area E:	3
A minimum of 5 units is required; 3 of the units are in Major	
PSY 201/PSY 202 (E.1.)	
(E.2.)* see Major Courses	
Area F:	0
A minimum of 3 units is required; 3 of the units are in Support	
Computer literacy (F.1.)* see Support Courses	
Total	47
A minimum of 76 units is required; 29 of the units are in Major and Support	

ELECTIVES..... 9

188

¹ MATH 116 and 117 will substitute for MATH 118 and are taught at a slower pace for those who need more review. MATH 117 will satisfy GEB area B.2.

FOOD SCIENCE MINOR

The Food Science minor is principally designed for students majoring in related academic disciplines who desire to seek employment in the food industry. Upon completion of this minor, students will have acquired the fundamental technical skills necessary to understand basic issues and concepts in food science such as food processing, food safety, quality assurance, and product development.

Required core: 15-16

- FSN 170 Introductory Food Science (4)
- FSN 217 Fundamentals of Food Processing Operations (4)
- FSN 230 Elements of Food Processing (4)
(NSCI majors wishing to complete FDSC minor to substitute 4 unit course from Emphasis area courses as FSN 230 is a required course in NSCI curriculum)
- FSN 331 Principles of Food Plant Sanitation (3) or
FSN 333 Quality Assurance in Food Industries (4)

Emphasis area courses: 11-12

Select courses (11-12 units) from the following list to complete the requirements for the minor

Food Science and Technology

- FSN 101 Orientation to Food Science (1)
- FSN 209 Procurement and Use of Muscle Foods (3)
- FSN 211 Muscle Food Science (3)
- FSN 212 Meat Grading and Evaluation (2)
- FSN 332 Statistical Quality Control (3)
- FSN 336 Food Packaging (3)
- FSN 338 Further Processing of Muscle Foods (3)
- FSN 339 Cereal Science and Processing (3)
- FSN 407 Food Composition Science (4)
- FSN 409 Sensory Evaluation of Food (4)
- FSN 410 Nutritional Aspects of Food Processing (4)
- FSN 431 Advanced Muscle Food Science (3)
- FSN 436 Food Laws and Regulations (3)
- DSCI 231 General Dairy Manufacturing (4)
- CHEM 435 Food Analysis (4)
- BACT 421 Food Microbiology (4)
- PM 330 Poultry Processing (3)

27

NUTRITIONAL SCIENCE MINOR

The Nutritional Science minor is designed for students majoring in academic disciplines such as Chemistry, Biochemistry, Biological Sciences, and Physical Education. By completing this minor, students will enhance their academic qualifications in terms of employment or for admission to medical or dental schools or to graduate programs in allied health.

Required core: 15

- FSN 210 Nutrition (3) (E.2)
- FSN 310 Maternal and Child Nutrition (3)
- FSN 315 Nutrition in Aging (3)
- FSN 328 Advanced Nutrition I (3)
- FSN 329 Advanced Nutrition II (3)

Emphasis area courses: 12

Select courses (12 units) from the following list to complete the requirements for the minor.

Clinical Nutrition

- FSN 412 Experimental Nutrition (2)
- FSN 429 Diet Therapy I (3)
- FSN 430 Diet Therapy II (3)
- CHEM 335 Clinical Chemistry (3)
- CHEM 377 Chemistry of Drugs and Poisons (3)
- PSY 317 Psychology of Stress (3)

Food Service Management

- FSN 331 Principles of Food Plant Sanitation (3)
- FSN 343 Institutional Foodservice I (3)
- FSN 426 Food Systems Management (3)
- FSN Institutional Foodservice II (3)
- FSN 436 Food Laws and Regulations (3)

Community Nutrition

- FSN 415 Methods of Teaching Nutrition (3)
- FSN 416 Community Nutrition (3)
- ED 305 Teaching and Learning Processes (3)
- POLS 371 World Food Politics (3)
- PSY 317 Psychology of Stress (3)

Sports Nutrition

- FSN 412 Experimental Nutrition (2)
- BIO 330 Biology of Aging (3)
- CHEM 335 Clinical Chemistry (3)
- CHEM 377 Chemistry of Drugs and Poisons (3)
- PE 303 Physiology of Exercise (4)
- PE 451 Nutrition for Fitness and Sport (3)
- PSY 304 Physiological Psychology (3)

27

MILITARY SCIENCE DEPARTMENT

Dexter Bldg. (34), Room 115
(805) 756-7682

Faculty

Department Head, Major John E. Bachmann

Captain Nicholas Spiriodigliozzi
 Captain Brian Page

PURPOSE

The Military Science Department conducts a dynamic four-year program of instruction which develops the mental and physical qualifications of graduates in preparation for positions of leadership within the military and civilian communities. Students may enroll at any time for full academic elective credit without incurring any military service obligation. However, the last two years of the program are oriented toward preparing the student for a military career. The innovative and well-taught courses complement all major areas of study by broadening the student's basic education. The complete curriculum includes both military leadership and management courses; courses which provide an awareness of the heritage of the U.S. Military; the Armed Forces' role in national defense strategy; professional military subjects; and military ethics. Students desiring to attain a highly sought-after commission as a Second Lieutenant in the U.S. army must meet eligibility requirements and complete the entire Military Science/ROTC (Reserve Officers' Training Corps) Advanced Course (25 units). To be eligible for participation in the Cal Poly ROTC Program, a student must be enrolled full time (12 units) at Cal Poly, have at least two years remaining as a university student to permit completion of the advanced course prior to reaching the 30th birthday, and be physically qualified.

FINANCIAL ASSISTANCE

Many opportunities for financial assistance are available to students. Three areas of opportunities are: ROTC cadets who sign a contract for Advanced Phase, students who earn an ROTC scholarship, and cadets who train with Reserve or National Guard units. All ROTC cadets sign a contract to participate in the Advanced Phase of ROTC and receive a \$100 a month allowance. Criteria to participate in the Advanced Phase are stated later. Highly competitive two-, three-, and four-year ROTC scholarships are available. The scholarship provides payment of full tuition, books, supplies, and the \$100 a month allowance for the duration of the scholarship. Students interested in scholarship competition should contact the Military Science Department at the time of application to the university. Reserve or National Guard training provides an additional two sources of financial assistance: approximately \$165 a month for one weekend

drill and approximately \$190 a month tuition assistance from the National Guard/Army Reserve "New GI Bill" benefits.

EQUIPMENT AND UNIFORMS

All necessary equipment, uniforms and textbooks for participation in the Military Science/ROTC program are furnished to the student by the United States Government free of charge. Title to this property, other than expendable items, remains with the government. Students entering into active commissioned service after graduation are granted a special \$300 uniform allowance.

FOUR-YEAR PROGRAM

The four-year program elective military science curriculum is divided into two diverse phases. The basic phase is primarily for freshmen and sophomores, and the advanced phase is for junior and senior level students.

BASIC PHASE

The Basic Phase is a two-year invigorating period where students may, without obligation, investigate the ROTC Program and the military as a full- or part-time career. Students may enter and leave this phase during any quarter. The curriculum for the basic phase is listed below and offers many challenging, exciting opportunities for all students. To become an ROTC cadet during this phase requires the student be registered for a Military Science class, completion of an ROTC enrollment form (obtained at the Military Science Department, Dexter Building, Room 115), and an interview with the ROTC Enrollment Officer. Because this phase is for students to examine the ROTC Program without penalty or obligation, participation in ROTC activities is encouraged but not mandatory. Advancement into the challenging Advanced Phase is accomplished either by successfully completing the Basic Phase classes, completing ROTC Summer Basic Camp or completing any military basic training program.

ROTC SUMMER BASIC CAMP

One method to qualify for the Advanced Phase is to successfully complete the six-week challenging ROTC Summer Basic Camp. Students normally attend Basic Camp between their second and third academic years. Transfer students may complete the camp during the summer immediately prior to their matriculation at Cal Poly. It is important that potential transfer students who plan to participate in the two-year ROTC program make their intentions known directly to the Military Science Department no later than June 1 of the year they plan to register at the university even though this date may precede the date of their final acceptance by the university.

The government will provide a transportation allowance to and from Basic Camp and pay at the rate of one-half of a Second Lieutenant's basic pay. All equipment, uniforms, room, board and medical care are furnished free while at camp. A maximum of 7 units elective credit may be earned for attending Basic Camp. No military obligation is incurred as a result of attendance.

BASIC TRAINING

Outstanding students who have successfully served on active duty, regardless of the branch of service, are qualified to enter the Advanced Phase because they have completed basic training for their particular branch of service. Also, students who have been or are members of Reserve or National Guard units and have completed basic training are qualified for the Advanced Phase.

ADVANCED PHASE

The Advanced Phase is a two-year period where ROTC cadets receive advanced leadership and management training. The cadets receive many hours of hands-on, practical leadership experiences to prepare them for a military career or a management position in the civilian sector. To become a cadet in the Advanced Phase a student must complete the Basic Phase or ROTC Summer Basic Camp or Basic Training. The student must also make a commitment to attend all required training activities and sign a contract to accept a commission in the United States Army. In return for the student's commitment, the Military Science Department will provide \$100 a month, classroom instruction, real leadership opportunities, and continuous feedback on each cadet's leadership progress. A six-week summer training camp, between the two years of the Advanced Phase, will be provided for testing and developing each cadet's leadership abilities. All equipment, uniforms, room, board, and medical care are furnished free while at this camp. The cadets will also receive approximately \$700 during the six weeks. Upon successful completion of the Advanced Phase and graduation from the university, the cadet will be commissioned as a Second Lieutenant in the United States Army.

SIMULTANEOUS MEMBERSHIP PROGRAM

Students can serve simultaneously in the National Guard or Army Reserve while they are cadets in ROTC and receive pay from both sources. Those who complete the ROTC Advanced Phase prior to graduation may continue serving in the Reserve or National Guard in the Simultaneous Membership Program. Since students can earn about \$3,000 each year, this program provides both financial and experience benefits.

Basic Phase

Freshman

- MSC 111 Orienteering (2)
- MSC 112 Survival Training: Wilderness (2)
- MSC 116 Basic Military Skills (2)

Sophomore

- MSC 211 Current Military Affairs (2)
- ¹ MSC 212 Basic Camp (1-7)
- MSC 213 Mountaineering (2)
- MSC 215 Leadership Management Seminar (2)
- MSC 225 Advanced Survival Techniques (2)
- MSC 226 Advanced Orienteering (2)
- MSC 229 Ranger Challenge (2)

Advanced Phase

Junior

- MSC 311 Leadership and Management (3)
- MSC 312 Leader Communication Skills (3)
- MSC 313 Tactical Military Operations (3)
- ² MSC 314 ROTC Advanced Camp (6)

Senior

- MSC 411 Military Professionalism and Ethics (3)
- MSC 412 Military Justice (2)
- MSC 413 Military Organization and Management (2)
- ³ HIST 308 American Warfare (3)

¹ Basic Camp is an *optional* 6-week summer training course (1-7 units) at Fort Knox, Kentucky.

² Advanced Camp is a *mandatory* 6-week summer training experience at Fort Lewis, Washington (6 credits).

³ Prerequisite to commissioning.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Military Science and other subjects.

NATURAL RESOURCES MANAGEMENT DEPARTMENT

Agricultural Sciences Bldg. (11), Room 217
(805) 756-2702

Faculty

Department Head, Norman H. Pillsbury

Brian C. Dietterick	Timothy R. Plumb
John H. Harris	Carolyn B. Shank
Lynn M. Jamieson	Michael J. Swiderski
Timothy G. O'Keefe	Richard P. Thompson
Douglas D. Piirto	James R. Vilkitis

Programs

B.S. Forestry and Natural Resources

with Concentrations in:

- Environmental Management
- Forest Resources—Management
- Forest Resources—Urban Forestry
- Forest Resources—Watershed, Chaparral, and Fire Management
- Parks and Forest Recreation

B.S. Recreation Administration

Students may select Adviser Approved Electives or a Concentration in:

- Commercial/Tourism Management
- Parks and Forest Recreation

FORESTRY AND NATURAL RESOURCES MAJOR

The Bachelor of Science degree program in Forestry and Natural Resources prepares students for important careers in the protection, management, and development of our forest and natural resources. Students may elect to emphasize forest and land management disciplines, such as recreation management; urban forestry; environmental management; watershed, chaparral and fire management; hardwood management; wildlife biology.

Students are strongly encouraged to complete a period of natural resources related work experience equivalent to one quarter of full-time work. This can be accomplished by a seasonal job, volunteer work, or the completion of an internship or cooperative education course. Work experience for academic credit must be documented by work supervisor and approved by student's academic adviser.

Graduates qualify for such positions as forester, environmental interpreter, urban forester, environmental specialist, park administrator, resource manager, park ranger, resource planner, watershed manager, and fire management specialist.

Cal Poly graduates are employed throughout the world: establishing, managing and regenerating forests and urban wildland areas; providing opportunities for recreation use of forests; teaching; extension; research; harvesting forest crops;

developing, processing and marketing wood products; and protecting and managing the environment.

Cal Poly provides the practical and analytical skills to meet the demands of tomorrow and helps students develop a strong foundation in forest and natural resources management principles.

Forest and natural resources facilities assist in the development of field skills. Special campus sites include Christmas tree plantations, weather station, greenhouses, woodlots, biomass energy plantations, logging competition arena, experimental watershed and reservoirs. The forest at Swanton-Pacific, an off-campus site near Santa Cruz, offers many educational opportunities for coursework and special studies on its 3200 acres of forests, wildlands and agricultural land areas. The site includes hardwood and redwood forest types, diverse ecosystems, streams and riparian habitat zones. In addition, the 70-acre Atlee School Forest and other nearby private resource areas, regional and State parks, and National Forests also provide opportunities for practical field experiences.

The curriculum provides a full range of courses in the humanities and the basic sciences and requires the completion of a concentration in a field of specialization to meet professional and employment requirements. Pregraduation employment in a natural resources area and internships reinforce classroom and laboratory experiences, and enhance opportunities for employment after graduation.

Opportunities for graduate studies are also available. Students may choose to develop thesis programs with an emphasis in selected fields of forest and natural resources, such as watershed and fire management, forest management, recreation, chaparral and hardwood ecosystem management, urban forestry, and environmental studies. The Master of Science degree is awarded with a specialization in General Agriculture. In addition, an agroforestry study program can be developed through the Master of Science degree program with a specialization in International Agricultural Development. For additional information, see the M.S. Agriculture section.

Cal Poly is a candidate institution for accreditation by the Society of American Foresters. Also, employment as a forester with the Federal Government is recognized by the U.S. Office of Personnel Management.

Curricular Concentrations

Concentrations prepare students for entry into the profession of forestry and natural resources. The curriculum provides broad training in forest and natural resource management with emphasis in urban forestry, watershed, chaparral and fire management, hardwood management, parks and forest recreation, environmental management, and wood energy

systems. Extensive field training occurs concurrently with classroom instruction.

Environmental Management

The environmental management concentration prepares students for employment as professionals in the fields of forestry and natural resources management planning, environmental impact assessment and evaluation, and environmental policy analysis. Individual student programs are developed.

Forest Resources—Management

Specialized areas of study are available through an emphasis in Hardwood Management or individualized studies in such areas as agroforestry, environmental studies, fish and wildlife management, parks and outdoor recreation, computer science, journalism, business administration, Spanish, and marketing.

Hardwood Management: The protection, utilization, and regeneration of hardwood communities as well as the principles of hardwood management that are necessary to meet the rising demand for the multiple use of hardwood forests and oak woodlands are studied.

Forest Resources—Urban Forestry

Management problems resulting from the continued trend of urbanization into the urban-wildland interface are studied. Urban Forestry focuses on the urban ecosystem including lesser vegetation, wildlife, and open space, as well as the trees. The curriculum emphasizes the application of forestry skills for management of urban forest ecosystems.

Forest Resources—Watershed, Chaparral and Fire Management

Students examine all aspects of water resource management in various forest ecosystems. The effects of watershed and fire management practices in chaparral and other Mediterranean-type ecosystems are studied in particular. An emphasis in forest hydrology is possible with adviser approved substitutions.

Parks and Forest Recreation

The parks and forest recreation concentration prepares students for employment in the planning, interpretation, development, and management of governmental and private resource-based parks and other recreational lands.

OTHER CONCENTRATIONS AVAILABLE

The Wildlife Biology concentration offered by the Biological Sciences Department is available to Forestry and Natural Resources majors and prepares students for employment in the fish and wildlife areas of law enforcement, management, and production. FNR majors following this concentration will meet the Wildlife Society's certification education requirements or the certification requirements of the American Fisheries Society based on choice of restricted electives. Prerequisite courses in zoology are required of students entering this concentration. Students in the Wildlife Biology concentration may deviate up to 17 units of designated courses toward prerequisites with prior written approval of adviser. See concentration description in Biological Sciences for curricular requirements.

Recommended Sequence: Major and Support Courses

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
Fall	Winter	Spring
FNR 140	BOT 121	CHEM 121
FNR 112	MATH 120	SS 121
FNR 201		
2nd Year		
Fall	Winter	Spring
FNR 208	AG 250/CSC 113	FNR 204/342
AE 237	STAT 211	STAT 212
BOT 223 ----->	BOT 326/333	
or CHEM 122 ---->	or CHEM 326	
or ZOO 131 ---->	or PHYS 104/121	
3rd Year		
Fall	Winter	Spring
FNR 302	FNR 303	FNR 318
FNR 304	FNR 316	ASCI 331/ CONS 120
STAT 313 or College Calculus	AE 345	
FNR 314		
4th Year		
Fall	Winter	Spring
FNR 305	FNR 407	FNR 406
FNR 401	FNR 415	FNR 418
FNR 403	FNR 461	FNR 442
FNR 440		

B.S. FORESTRY AND NATURAL RESOURCES

Courses are displayed by Major, Support, Concentration, General Education and Breadth, and Electives. 60 units must be 300-400 level.

MAJOR COURSES

	Units
FNR 112 Parks and Outdoor Recreation	3
FNR 140 Career Development and Planning in Natural Resources Management.....	1
FNR 201 Forest Resources	3
FNR 204 Resource Fire Control or FNR 342 Fire Ecology	2
FNR 208 Dendrology	4
FNR 302 Natural Resources Policy	3
FNR 303 Forest Protection	5
FNR 304 Ecology of Resource Areas	4
FNR 305 Forest Harvesting.....	3
FNR 314 Forest Mensuration	5
FNR 316 Growth and Yield	3
FNR/LA 318 Appl. GIS Natural Resources	2
FNR 401 Natural Resource Economics	3
FNR 403 Environmental Impact Analysis	3
FNR 406 Natural Resources Administration	2
FNR 407 Silviculture and Vegetation Management ...	4
FNR 415 Forest and Natural Resources Valuation.....	3
FNR 418 Integrated Forest Resources Management...	4
FNR 440 Watershed Management	3
FNR 442 Watershed Protection	2
FNR 461 Senior Project	3
AE 237 Engineering Surveying I.....	2
ASCI 331/CONS 120.....	2
SS 121 Introductory Soil Science	4

73

SUPPORT COURSES * = Courses satisfy GEB

AE 345 Aerial Photogram. & Remote Sensing	3
AG 250 Computer Application to Agriculture or CSC 113 Computers and Computer Applications: Macintosh (F.1.)*	3
BOT 121 General Botany (B.1.b.)*	4
CHEM 121 General Chemistry (B.1.a.)*	4
ECON 201 Survey of Economics (D.3.)*	3
ENGL 218 Professional Writing: Argumentation and Reports (A.4.)*	4
¹ MATH 120 Pre-Calculus Algebra and Trig. (B.2.)* ...	5
STAT 211 Elem. Probability and Statistics (B.2.)*	3
STAT 212 Statistical Methods.....	3
STAT 313 or College calculus.....	3
Adviser approved science course sequence (B.1.a. or B.1.b.) (BOT 223, BOT 326/BOT 333 or CHEM 122 CHEM 326 or ZOO 131, PHYS 104/PHYS 121)	8
Concentration courses (see below).....	26

69

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300-400 level. Additional GEB courses are listed under Support Courses.

Area A:	10
A minimum of 14 units is required; 4 of the units are in Support	
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
(A.4.)* see Support Courses	
Area B	0
A minimum of 18 units is required; 18 of the units are in Support	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)* see Support Courses	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Lit, phil, arts elective (300-400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	15
A minimum of 18 units is required; 3 of the units are in Support	
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
Economics (D.3.)* see Support Courses	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:.....	0
A minimum of 3 units is required; 3 of the units are in Support	
F.1. *see Support Courses	
Total.....	48
A minimum of 76 units is required; 28 units are in Support	
ELECTIVES	8
	198

¹ MATH 118 and 119 will substitute for MATH 120 and are taught at a slower pace for those who need more review. Also, MATH 116 and 117 will substitute for MATH 118 for those people who need extra review.

CONCENTRATIONS (Select one)**Environmental Management Concentration**

FNR 339/FNR 400	4
FNR 404 Environmental Law	3
FNR 408 Water Resource Law and Policy	3
CRP 212 Introduction to Urban Planning	3
ENVE 330 Environmental Quality Control	3
SS 433 Land Use Planning	3
Restricted electives with prior written approval of adviser	7
	<u>26</u>

Forest Resources—Management Concentration

FNR 332/FNR 434/FNR 438	4
FNR 333 Hardwood Management	3
FNR 220/339/AG 485 (prior written approval required)	4
¹ FNR 342 Fire Ecology or FNR 204 Resource Fire Control	2/3
Restricted electives with prior written approval of adviser	12/13
	<u>26</u>

Forest Resources—Urban Forestry Concentration

FNR 325 Woodlot and Christmas Tree Mgt.	3
FNR 333 Hardwood Management	3
FNR 350 Urban Forestry	3
FNR 450 Community Forestry	3
Restricted electives with prior written approval of adviser	14
	<u>26</u>

**Forest Resources—Watershed, Chaparral, and Fire
Management Concentration**

¹ FNR 204 Resource Fire Control or FNR 342 Fire Ecology	2/3
FNR 250 Survey & Mgt. of Mediter. Ecosystems	2
FNR 340 Resource Fire Management	2
FNR 345 Chaparral Management	3
FNR 441 Forest and Range Hydrology	3
SS 440 Forest and Range Soils	4
Restricted electives with prior written approval of adviser	9/10
	<u>26</u>

Parks and Forest Recreation Concentration

FNR 220/339/AG 485 (prior written approval required)	4
FNR 311 Environmental Interpretation	4
LA 363 Rec. Open Space Planning & Design	3
REC 210 Introduction to Program Design	4
Restricted electives with prior written approval of adviser	11
	<u>26</u>

¹ Students cannot take a course as part of the core and as part of a concentration.

RECREATION ADMINISTRATION

Organizations offering leisure services and products exist as a result of the demand for increased leisure opportunity. The Bachelor of Science degree program in Recreation Administration offers professional preparation for employment in public, non-profit, private, and commercial leisure service organizations. Students may pursue a concentration in commercial/tourism management, parks and forest recreation or a course of study in program management that includes: special events, early childhood education, senior adult programming, aquatics and recreational sports, and cultural arts. In addition, leisure education courses provide university students with leisure lifestyle management skills. The major is accredited by the National Recreation and Park Association/American Association of Leisure and Recreation Council on Accreditation.

The major includes a 400 hour required internship (one quarter) in a leisure service organization. Graduates qualify for diverse positions as recreation supervisors, park and recreation administrators, travel and tourism specialists, environmental education instructors, theme park managers, private recreation club managers, employee services and recreation specialists, chamber of commerce specialists, convention and visitor bureau program directors, meeting specialists and special event planners.

Recreation Administration graduates are employed in settings located in and out of the United States planning, organizing, implementing and evaluating leisure services to residents, tourists, and target participants. Sound administrative management skills learned in the program and through practical and research applications allow for career progress into executive management within leisure service industry.

Students have access to the department's field laboratories and also develop competencies in a myriad of external sites to include ropes course leadership laboratories, environmental education centers, leisure business and recreation departments. Students operate major special events and programs and conduct leisure research in required and elective coursework.

In addition to major requirements, the curriculum provides a full range of general education and support courses designed to fully educate and prepare students for a global society where bilingual language, arts, cultural diversity and international understanding are developed. Those interested in graduate study may pursue a Master of Science degree in General Agriculture with special emphasis in Park, Recreation and Tourism Management.

CURRICULAR CONCENTRATIONS

Commercial/Tourism Management

This concentration emphasizes preparation for employment in organizations that provide leisure products or services for profit or financial self-sufficiency. An emphasis on recreation business is targeted to the following settings: employee services and recreation, travel and tourism, product sales and manufacturing, public/private entrepreneurship, joint commercial-public ventures, and small business opportunities. Specific focus on agrotourism, leisure industry

entrepreneurship; relates leisure services management to economic development.

Parks and Forest Recreation

Students in Recreation Administration may choose this concentration previously described in the Forestry and Natural Resources major. This concentration prepares students to enter park and recreation departments at the local, county/regional, state and federal levels.

B.S. RECREATION ADMINISTRATION

Courses are displayed by Major, Support, Concentration, General Education and Breadth, and Electives. 60 units must be 300-400 level.

	Units
MAJOR COURSES	
REC 101 Intro. to Recreation and Leisure Services	3
REC 105 Recreation Leadership	3
REC 110 Career Development and Planning in Recreation Administration	1
REC 210 Introduction to Program Design	4
REC 252 Leisure and Special Populations	3
REC 310 Program Administration in Leisure Services	4
REC 324 Legal and Managerial Patterns in Recreation Administration	3
REC 327 Human Dimension of Leisure	3
REC 424 Financing Recreation and Leisure Services ..	4
REC 460 Research in Recreation Administration	4
REC 461 Senior Project	3
REC 462 Senior Project	2
REC 465 Internship	6
FNR 410/OH 337/LA 363	3
MGT 314 Human Resources Management	4
Concentration courses (see below) or adviser approved electives	28
	<hr/> 78

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

ACTG 211 Financial Accounting for Nonbusiness Majors	4
BOT 121 General Botany (B.1.b.)	4
CSC 113 Computers and Computing or AG 250 Computer Applications (F.1.)	3
ENGL 310 Corporate Communications	4
GEOG 308 Global Geography (D.4.b.)	3
JOUR 312 Introduction to Public Relations	4
MATH 118 Pre-Calculus Algebra	4
SOC 333 Social Research Methods or PSY 329 Research Methods in Psychology and Human Development	3
STAT 211 Elementary Probability and Statistics (B.2)*	3
FNR 300/CSC 110/120/410/STAT 212	3
Foreign language	4

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/202 (A.3.)	
ENGL 215/218 (A.4.)	
Area B:	7
<i>A minimum of 18 units is required; 11 of the units are in Support</i>	
Physical and life science electives (B.1.)	
Life science (B.1.b.)* see Support Courses	
Mathematics (B.2.)* see Support Courses	
Statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	15
<i>A minimum of 18 units is required; 3 of the units are in Support</i>	
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 221 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
(D.4.b.)*see Support Courses	
Area E:	5
PSY 201/202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304 (E.2.)	
Area F:	0
<i>A minimum of 3 units is required; 3 of the units are in Support</i>	
(F.1.) *see Support Courses	
Total	59
<i>A minimum of 76 units is required; 17 units are in Support</i>	

Electives	10
	<hr/> 186

CONCENTRATION OR ADVISER APPROVED ELECTIVES

Select either a concentration or adviser approved electives.

Commercial/Tourism Management Concentration

REC 314 Travel and Tourism Planning	4
REC 317 Convention and Meeting Management	3
REC 464 Organization and Development of Commercial Leisure Services	4
Restricted electives	17
	<hr/> 28

Parks and Forest Recreation Concentration

FNR 112 Parks and Outdoor Recreation	3
FNR 208 Dendrology	4
FNR 311 Environmental Interpretation	4
REC 302 Environmental Education	3
Restricted electives	14
	<hr/> 28

Adviser Approved Electives	28
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Recommended Sequence: Major and Support Courses

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
Fall	Winter	Spring
REC 101	REC 110	MATH 118
REC 105	CSC 113/AG 250	
2nd Year		
Fall	Winter	Spring
REC 210	REC 252	STAT 212/FNR 300/CSC 110, 120, or 410
ACTG 211	STAT 211	
3rd Year		
Fall	Winter	Spring
REC 324	REC 310	REC 327
REC 317	SOC 333/PSY 329	FNR 410/OH 337/LA 363
ENGL 310	MGT 314	REC Elective
	JOUR 312	
4th Year		
Fall	Winter	Spring
REC 460	REC 461	REC 462
Foreign Language	REC 424	REC 465

ORNAMENTAL HORTICULTURE DEPARTMENT

Agricultural Sciences Bldg. (11), Room 244
(805) 756-2279 FAX (805) 756-2869

Faculty

Interim Department Head, Stephen F. Angley

Patricia H. Breckenridge	Daniel E. Lassanske
James A. D'Albro	William E. Noble
Thomas E. Eltzroth	Virginia R. Walter
David W. Hannings	Michael D. Zohns

Program

B.S. Ornamental Horticulture

The Bachelor of Science degree in Ornamental Horticulture offers the student a comprehensive preparation for attractive positions in the nursery, greenhouse, landscape, and floriculture industries. This includes both the production and sales-service areas of these major fields. The curriculum stresses production and marketing of nursery plants, fresh flowers, flowering plants, and foliage plants; landscape contracting, design, installation and management; and marketing.

Graduates of the Ornamental Horticulture Department are in demand for management and sales positions within the dynamic nursery and floriculture industries, as well as the large and diverse areas within the landscape industries.

Cal Poly graduates are employed nationally and internationally as business owners, growers, managers, researchers, educators, salespersons, landscape contractors, designers, landscape management professionals, extension agents, agricultural commissioners, consultants, and park and golf course superintendents.

The facilities of the department include a student-operated commercial greenhouse range and nursery in which students carry on a project program involving wholesale and retail sales and a student-operated plant shop. Also included are 35,000 square feet of greenhouses; 7,500 square feet of shadehouses; and an extensive field container growing area. The department also has several modern, well-equipped laboratories including: Tissue Culture, Landscape Industries with CAD, Floriculture, and Plant Materials. In addition to 200 acres of landscaped campus, an arboretum is also utilized as an outdoor laboratory. The campus is planted with many interesting and unusual trees and shrubs from all over the world, as well as native plant materials.

Also available are the latest models of equipment necessary in nurseries, greenhouses, parks and grounds, landscaping, and florist shops. An extensive list of periodicals covering the

field of ornamental horticulture is available to students. Through the staff, affiliation in several national and state horticultural organizations is maintained.

The curriculum is well grounded in the sciences and, through the flexibility of 28 units of adviser-approved electives, students can tailor coursework to meet their individual needs. Areas of interest include: landscape management, landscape technologies and implementation, floriculture production and management, nursery production and management, retail horticulture, turf production and management, horticultural communications, horticultural biotechnology, post-harvest physiology and technology, and teaching agriculture. Students may also choose to complete a minor in Agribusiness or Plant Protection.

B.S. ORNAMENTAL HORTICULTURE

Courses are displayed by Major, Support, Concentration, General Education and Breadth, and Electives. 60 units must be 300-400 level.

MAJOR COURSES

	Units
OH 110 Orientation to Environmental Horticultural Science	1
OH 121 Fundamentals Environmental Horticulture I	4
OH 122 Fundamentals Environmental Horticulture II	4
OH 123 Landscape Installation and Maintenance	2
OH 124 Plant Propagation	4
OH 126 Environmental Horticulture Construction	2
OH 200/210/401	2
OH 221 Water Issues and Delivery Systems	3
OH 222 Abiotic Plant Problems	3
OH 231, OH 232 Plant Materials	4,4
OH 427 Diseases & Pest Control Sys. Ornam. Plants	4
OH 461 Senior Project	2
OH 462 Senior Project	2
OH 463 Senior Seminar.....	1
Adviser approved electives. 18 units 300-400 level ..	28

70

SUPPORT COURSES * = Courses satisfy GEB

ACTG 211 Financial Accounting for Nonbusiness Majors.....	4
BIO 302/PHYS 104/PSC 101	3/4
BOT 121 General Botany (B.1.b.)*	4
BOT 322 Introductory Plant Physiology (B.1.b.)*	4
BOT 324 Ornamental and Forest Pathology	4
BUS 201/207 Business Law Survey	3/4
CHEM 121 General Chemistry (B.1.a.)*	4
CHEM 122 General Chemistry (B.1.a.)*	4
CHEM 326 Survey of Organic Chemistry	4
CSC 110 Computers & Computer Appl.: MS-DOS or AG 250 Computer Appl. to Agriculture (F.1.)*	3
CRSC 311 Insect Pest Management.....	4
MATH 118 Pre-Calculus Algebra.....	4
(or MATH 116 & MATH 117)	
SPAN 111 Elementary Hispanic Language and Culture	4
SS 121 Introductory Soil Science	4
SS 221 Fertilizers	4
STAT 130 Intro. to Statistical Reasoning or STAT 211 Elementary Probability and Statistics	3

60/62

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300-400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	

Area B:	0
A minimum of 18 units is required; 18 of the units are in Support	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)* see Support Courses	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300-400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/ECON 211 (D.3.)	
ANT 201/GEOG 150/SOC 105(D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC (300-400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 General Psychology (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:.....	0
A minimum of 3 units is required; 3 of the units are in Support	
Computer literacy (F.1.) *see Support Course	
Total.....	55
A minimum of 76 units is required; 21 units are in Support	

ELECTIVES..... 9/7

194

Recommended Sequence: Major and Support Courses

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
Fall	Winter	Spring
OH 110	OH 122	OH 124
OH 121	OH 123	OH 126
BOT 121		OH 231
CHEM 121	CHEM 122	SS 121
2nd Year		
Fall	Winter	Spring
OH 221	OH 222	
OH 232		
SS 221		
3rd Year		
Fall	Winter	Spring
ENT 220/CRSC 311		BOT 324
4th Year		
Fall	Winter	Spring
OH 461	OH 463	OH 462
OH 427		

SOIL SCIENCE DEPARTMENT

Science Bldg. (52), Room C-43
(805) 756-2261 FAX (805) 756-5412

Faculty

Department Head, Terry L. Smith

Gaston Amedee	Thomas J. Rice, Jr.
Delmar D. Dingus	Thomas A. Ruehr
Brent G. Hallock	Ronald D. Taskey
Royce L. Lambert	

Programs

B.S. Soil Science

with Concentrations in:

Environmental Management
Environmental Science and Technology
Land Resources

Three-fourths of the world's food and nearly all of its fiber come from the fragile, thin skin of the land's surface—the soil. Moreover, soil absorbs and transmits rain and snow which replenish our groundwater; and it captures great quantities of environmental wastes. Soil scientists are the most knowledgeable and best trained people responsible for the management of soil, one of our most precious natural resources.

The Bachelor of Science degree in Soil Science provides fundamental knowledge and skills needed for field, laboratory, management, and teaching positions, as well as for graduate studies. Concentrations are offered in Land Resources, Environmental Management, and Environmental Science and Technology. These high quality programs help ensure that our graduates are well prepared for the diverse opportunities awaiting them. Moreover, graduates can meet educational requirements for professional certification by the American Registry of Certified Professionals in Agronomy, Crops and Soils, and as Certified Professional Erosion and Sediment Control Specialists.

Students are encouraged to reinforce their education, develop professional contacts, and strengthen their career potential by participating in any of the following activities: the Soils Club and the Soil and Water Conservation Society, each of which is nationally affiliated; the Soil Judging Team, which commonly qualifies for national competition; the Soil Testing Enterprise Program, which analyzes soil and water samples for local growers and gardeners; and internships and cooperative education programs with government and industry. Each of these opportunities, combined with a friendly, helping atmosphere, provide students a college experience that is highly personable as well as rewarding. Students also are encouraged to investigate opportunities for international education. Please see the Study Abroad program section of this catalog.

Facilities of the department include laboratories having up-to-date analyzers, a glasshouse and a computer room. The

department has access to several thousand acres of agricultural, forest and range land managed by the College of Agriculture. All of the facilities, equipment and land, which allow practical application of classroom knowledge, are for student use.

Our undergraduate soil science program ranks among the largest and strongest in the nation. Our graduates are employed from Alaska to Mexico, Maine to Hawaii, and on every continent. Their Cal Poly experience has provided them with the strong scientific foundation, practical skills and balanced general education needed to be flexible and competitive in today's diverse, and often unpredictable, job market.

Undergraduate and graduate students majoring in soil science earn a solid, useful education; likewise, students from other fields who select soil science courses as electives can augment their skills and knowledge, making them more adaptable to changing professional opportunities. Moreover, all students can discover soil's vital role in their lives, and the human dependence on the quality of soil for quality of life.

Cal Poly offers a Master of Science degree in Agriculture with a specialization in Soil Science. For information regarding this degree program, please refer to the M.S. Agriculture section.

CURRICULAR CONCENTRATIONS

Land Resources

This concentration prepares students for professional opportunities in soil and water conservation, farm advisement, fertilizer and agricultural chemicals industries, forest and range soils, urban land enhancement, laboratory analysis, soil surveying, environmental issues, and international agriculture. The flexibility of this concentration allows students to pursue one of several approved minors, and to prepare for graduate studies.

Environmental Management

This concentration offers a solid scientific background melded with environmental policy and administration, site analysis, and resource planning. The program helps prepare students for managerial positions dealing with today's complicated environmental problems and opportunities.

Environmental Science and Technology

This concentration provides the strongest foundation for evaluating and solving complex environmental problems, including land and water degradation and contamination by hazardous wastes. Additionally, the concentration includes courses needed for admission to rigorous graduate programs.

B.S. SOIL SCIENCE

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements

	Units
SS 110 Orientation in Soil Science.....	1
SS 121 Introductory Soil Science	4
SS 202 Soil and Water Conservation	3
SS 221 Fertilizers and Plant Nutrition	4
SS 223 Rocks and Minerals	4
SS 312 Agricultural Climatology	3
SS 321 Soil Morphology	4
SS 322 Soil Fertility.....	4
SS 422 Soil Microbiology.....	3
SS 423 Soil and Water Chemistry	4
SS 431 Soil Resource Inventory.....	3
SS 432 Soil Physics.....	4
SS 461 Soils Senior Project.....	1
SS 462 Soils Senior Project.....	3
SS 463 Undergraduate Soils Seminar.....	2
BOT 121 General Botany (B.1.b.)*	4
GEOL 201 Physical Geology	3
Concentration courses (see below).....	38
	<hr/> 92

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

AE 340/AE 415/AE 435/AE 440	3
AG 250 Computer Application to Agriculture or CSC 111 Intro. to Computer Applications (F.1.)* ..	3
BACT 224 General Microbiology (B.1.b.)*	4
BACT/BIO/BOT restricted elective (300–400)	4
CHEM 127 General Chemistry (B.1.a.)*	4
CHEM 128 General Chemistry (B.1.a.)*	4
CHEM 129 General Chemistry	4
CHEM 328 Survey of Biochemistry	4
¹ MATH 118 Pre-Calculus Algebra or MATH 131 Technical Calculus (B.2.)*	4
¹ MATH 119 Pre-Calculus Trigonometry or MATH 132 Technical Calculus (B.2.)*	3
PHYS 121 College Physics (B.1.a.)*	4

41
GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B	0
A minimum of 18 units is required; 18 of the units are in Support	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)* see Support Courses	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/ECON 211 (D.3.)	
ANT 201/GEOG 150/SOC 105(D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 General Psychology (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:.....	0
A minimum of 3 units is required; 3 of the units are in Support	
Computer literacy (F.1.) *see Support Course	
Total.....	<hr/> 55
A minimum of 76 units is required; 21 units are in Support	
ELECTIVES	10
	<hr/> 198

¹ Students in the Environmental Science and Technology concentration take MATH 131 and MATH 132.

CONCENTRATIONS (select one):**Land Resources Concentration**

CHEM 326 Survey of Organic Chemistry	4
CRSC 311 Insect Pest Management.....	4
CRSC 411 Experimental Techniques and Analysis	4
STAT 211 Elem. Probability and Statistics	3
Additional courses selected from approved list, with at least four courses from College of Agriculture. These units may be selected to apply toward an approved minor.	23
	<hr/> 38

Environmental Management Concentration

CHEM 326 Survey of Organic Chemistry	4
CRP 212 Introduction to Urban Planning	3
ENVE 330 Environmental Quality Control	3
FNR 403 Environmental Impact Analysis	3
FNR 405 Applied Resource Analysis	4
FNR 404 Environmental Law or FNR 408 Water Resource Law and Policy.....	3
SS 339 Soil Science Internship or SS 400 Special Problems Advanced Undergrads (designed for this concentration & faculty approved)	3
SS 433 Land Use Planning	3
Select 2: CRSC 411/STAT 211/STAT 212	6
Select 2: ECON 431/432; POLS 314/404/405	6
	<hr/> 38

**Environmental Science and Technology
Concentration**

CHEM 316 Organic Chemistry	4
CHEM 317 Organic Chemistry	5
CHEM 318 Organic Chemistry	5
CHEM 331 Quantitative Analysis I	5
ENVE 434 Water Quality Measurements	2
ENVE 436 Introduction to Hazardous Waste Management or ENVE 439 Solid Waste Management.....	3
MATH 133 Technical Calculus	4
STAT 321 Statistical Analysis I	3
STAT 322 Statistical Analysis II.....	4
Select from the following: BOT 322, CHEM 341, CSC 251, STAT 324, ZOO 131 or other faculty approved courses.	3
	<hr/> 38



DESIGN VILLAGE

Every spring, architecture and design students from across the west participate in Cal Poly's Design Village. For this 3-day, hands-on event students design and create portable structures in response to the annual theme, site conditions, and the functional requirement to house the designers. Students participate in workshops and attend lectures that relate to the conference theme. The conference concludes with judging of the students' structures by a select group of architects.

College of

ARCHITECTURE

and

ENVIRONMENTAL

DESIGN



ELECTRONIC DESIGN STUDIO

Architecture professor Joe Amanzio assists students in the Electronic Design Studio. All designs are developed electronically through presentation.

College of Architecture and Environmental Design

**Architecture and Environmental
Design Bldg. (05), Room 212
(805) 756-1321**

**Paul R. Neel, FAIA, Dean
K. Richard Zweifel, Associate Dean**

Department/Location:	Program:
Architectural Engineering	Architectural Engineering: BS
Architecture	Architecture: B.Arch., MS
City and Regional Planning	City and Regional Planning: BS, MCRP
with College of Engineering	Transportation Planning: MCRP/MS Engineering
Construction Management	Construction Management: BS
Landscape Architecture	Bachelor of Landscape Architecture

The five undergraduate programs, listed above, have a common objective: the betterment of the human physical environment. These programs endeavor to give the student a set of social values, a technical background, and training which result in creative expressions that are effective both professionally and personally.

The masters programs are designed for students interested in advanced professional studies. The joint MCRP/MS Engineering with a specialization in Transportation Planning is an interdisciplinary program. It is a cooperative effort between the Colleges of Engineering and Architecture and Environmental Design.

The excellent college facilities include design laboratories, grading galleries, soils laboratory, stress laboratory, construction shop, project yard, instructional resource center, computer laboratories, multi-media laboratory, and photo presentation laboratory. An outlying area of 12 acres known as the "Canyon" is available for extensive experimental construction.

The location of the campus between the great population centers of San Francisco and Los Angeles is ideal for environmental studies ranging from rural to large metropolitan complexes. There is a continual stream of visiting lecturers. Field trips are arranged to various parts of the state as required work. Additionally, the college offers several opportunities through departmentally sponsored programs for directed foreign study. Students also regularly participate in The California State University's International Programs in Denmark and Italy.

Departments are members of their respective professional associations: the Association of Collegiate Schools of Architecture, the Council of Educators in Landscape Architecture, the Association of Collegiate Schools of Planning, and the Associated Schools of Construction. Likewise, students maintain active chapters of the professional organizations of the American Institute of Architects, the American Society of Landscape Architects, the Associated General Contractors, the Structural Engineering Association of California, the American Planning Association, and the National Society of Architectural Engineers.

The college's Design Institute is available for students and faculty to pursue advanced professional and interprofessional studies as applied investigations and community service. The Institute has several research and service units including: Barrier-Free Design, Computer-Aided Design, Earthquake-Resistant Building Systems, Geographic Information System Technology, Small Town and Rural Planning Issues and Community Service.

Students interested in pursuing one of the five undergraduate program offerings within the college should familiarize themselves with the appropriate curriculum flow chart, available through the University Admissions Office and the Student Services Coordinator, Architecture and Environmental Design Bldg. (05), Room 212. Special attention is directed to the strict sequencing of courses and prerequisite requirements. Students who plan to transfer from a California community college should schedule classes to maximize transfer units. Reference should be made to the "Articulation Agreement" located in the community college counseling center.

All student work submitted for course credit becomes college property and will be returned only at the discretion of the instructor.

ARCHITECTURAL ENGINEERING DEPARTMENT

Engineering West (21), Room 110
(805) 756-1314

Faculty

Department Head, John W. Edmisten

Mark Berrio	Hong Ting Liu
Michael R. Botwin	Satwant S. Rihal
Jacob Feldman	

Program

B.S. Architectural Engineering

The program in Architectural Engineering leads to the Bachelor of Science degree and has its major emphasis in the structural engineering of buildings. Students are encouraged to develop aptitudes in science and mathematics for creative engineering accomplishments. Graduates of this program will generally seek professional registration as structural engineers. The Architectural Engineering curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (A.B.E.T.).

The curriculum prepares the student to enter the field of architectural engineering, structural engineering, and the technically oriented aspects of architecturally related fields. In addition, students are prepared to pursue graduate studies in the fields of architectural engineering, civil engineering, structural engineering, structural mechanics, and foundation engineering.

B.S. ARCHITECTURAL ENGINEERING

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

	Units
MAJOR COURSES	
ARCE 221 Elementary Structures.....	3
ARCE 222 Mechanics of Structural Members I.....	3
ARCE 223 Mechanics of Structural Members II and	
ARCE 224 Mechanics of Structural Members Lab .	3,1
ARCE 227 Structural Analysis I.....	2
ARCE 302 Structural Analysis II	3
ARCE 303 Steel Design.....	3
ARCE 304 Timber Design.....	3
ARCE 305 Masonry Design.....	2
ARCE 306 Matrix Analysis of Structures	3
ARCE 325 Dynamics	4
ARCE 351, 352, 353 Structural Computing	
Analysis I, II, III	1,1,1
ARCE 371 Structural Systems Laboratory	3
ARCE 372 Steel Structures Design Laboratory.....	3
ARCE 403 Advanced Steel Structures Laboratory or	
ARCE 447 Advanced Reinforced Concrete Lab	3
ARCE 421 Soil Mechanics	3
ARCE 422 Foundation Design and	
ARCE 444 Reinforced Concrete Lab.....	3,3
ARCE 445 Prestressed Concrete Design Laboratory	
or ARCE 446 Advanced Structural Systems Lab	3
ARCE 451 Timber and Masonry Structures Design Lab	3
ARCE 452 Concrete Structures Design Laboratory.....	3
ARCE 453 Senior Project Laboratory.....	3
ARCE 457 Structural CAD for Building Design	2
ARCE 481 Structural Models Laboratory.....	1
ARCE 483 Seismic Analysis and Design	4
Approved technical electives	4
	<hr/> 74

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

ARCH 106 Materials of Construction.....	3
ARCH 111 Introduction to Drawing and Perspective .	3
ARCH 221, 222 Architectural Design Basics.....	3,3
ARCH 231 Architectural Practice.....	3
ARCH 317/ARCH 318/ARCH 319 (C.3.)*	3,3
CHEM 124 General Chemistry (B.1.a.)*	4
CM 433 Economic Analysis for Engineers	2
CSC 251 Digital Computer Applications (F.1.) *	2

CSC 331 Numerical Linear Analysis	3
EDES 101 Introduction to Architecture and Environmental Design	2
EDES 113 Graphic Analysis and Communication Skills for Designers	3
EE 201 Electrical Circuit Theory	3
GEOL 201 Physical Geology (B.1.a.)*	3
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II (B.2.)*	4
MATH 143 Calculus III	4
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
MATH 318/STAT 211/GEOL 205	3
ME 302 Thermodynamics	3
ME 341 Fluid Mechanics	3
PHYS 131 General Physics (B.1.a.)*	4
PHYS 132, 133 General Physics	4,4
	<hr/> 84

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	3
<i>A minimum of 18 units is required; 15 of the units are in Support</i>	
Physical science (B.1.a.) * see Support Courses	
Life sciences elective (B.1.b.)	
Mathematics/statistics (B.2.) * see Support Courses	
Area C:	12
<i>A minimum of 18 units is required; 6 of the units are in Support</i>	
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts (C.3.) *see Support Courses	
Area C * see Support Courses	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOL 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOL/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	

Area F	0
<i>A minimum of 2 units is required; 2 of the units are in Support</i>	
Computer literacy (F.1.) *see Support Courses	
Total	<hr/> 52
<i>A minimum of 76 units is required; 24 of the units are in Support</i>	
ELECTIVES	0
	<hr/> 210

Recommended Sequence: Major and Support Courses

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
Fall	Winter	Spring
ARCH 111	ARCH 106	EDES 113
EDES 101	MATH 142	MATH 143
MATH 141	PHYS 131	PHYS 132
2nd Year		
Fall	Winter	Spring
ARCE 221	ARCE 222	ARCE 223
ARCH 221	ARCH 222	ARCE 224
MATH 241	MATH 242	ARCE 227
PHYS 133	CSC 251	ARCE 351
		ARCH 231
3rd Year		
Fall	Winter	Spring
ARCE 302	ARCE 303	ARCE 304
ARCE 371	ARCE 306	ARCE 372
ARCE 421	ARCE 325	ARCE 422
CSC 331	ARCE 352	ARCE 305
4th Year		
Fall	Winter	Spring
ARCE 444	ARCE 452	ARCE 453
ARCE 451	ARCE 403 or 447	ARCE 445 or 446
ARCE 483	ARCE 481	
ARCE 353	CM 433	

ARCHITECTURE DEPARTMENT

Architecture and Environmental Design Bldg. (05), Room 212A
(805) 756-1316 FAX (805) 756-1500

Faculty

Director, Administrative Affairs, James R. Bagnall

Director, Academic Affairs, Allan R. Cooper

Joseph C. Amanzio	Laura V. Joines
Sharad D. Atre	George K. Ikenoyama
Ronald E. Batterson	Brian B. Kesner
William R. Benedict	Kenneth M. Kohlen
David A. Brodie	Sandra D. Lakeman
Arthur J. Chapman	John H. Lange
M. Polly Cooper	Larry H. Loh
M. Bilgi Denel	David Lord
Serim Denel	Margot McDonald
Donna P. Duerk	Sandra D. Miller
Merrill C. Gaines	Daniel L. Panetta
Bradford C. Grant	Jens G. Pohl
Donald P. Grant	Charles W. Quinlan
Terry C. Hargrave	Howard Weisenthal
John E. Harrigan, Jr.	Donald S. Woolard
George Hasslein	Christopher Yip
Patrick D. Hill	

Programs

B.Arch. Architecture

M.S. Architecture

The objective of the five-year Bachelor of Architecture degree program is to develop design and related skills necessary for entry into the professional field of architecture. Preparation for architecture spans several disciplines and requires a range of aptitudes. As the architect has a responsibility for solving problems of the built environment involving people, an understanding and sensitivity to human needs is required. Therefore, programs in architecture are broad in nature. With careful selection of elective work, areas of specialization can be included. The Bachelor of Architecture degree is accredited by the National Architectural Accrediting Board.

Most states require that an individual intending to become an architect hold an accredited degree. There are two types of degrees that are accredited by the National Architectural Accrediting Board: (1) the Bachelor of Architecture, which requires a minimum of five years of study, and (2) the Master of Architecture, which requires a minimum of three years of study following an unrelated bachelor's degree or two years following a related preprofessional bachelor's degree. These professional degrees are structured to educate those who aspire to registration/licensure as architects.

The four-year, preprofessional degree, where offered, is not accredited by the NAAB. The preprofessional degree is useful

for those wishing a foundation in the field of architecture, as preparation for either continued education in a professional degree program or for employment options in architecturally related areas.

OFF-CAMPUS ARCHITECTURE PROGRAMS

CSU International Programs for Architecture

There are two organized studio programs for Architecture majors, one in Copenhagen, Denmark, and one in Florence, Italy. The concept of the studio organization is similar to Cal Poly. Credit for major design courses, some professional electives, some general education courses and free electives are handled through approved overseas study centers. Architecture majors in their fourth year of study overseas are required to complete ARCH 407, Environmental Control Systems, and ARCH 441 and ARCH 442, Professional Practice, upon return to the Cal Poly campus.

Applications for the International Programs are due February 1 of each year. The applicants are notified prior to the beginning of Spring Quarter as to the results of the Screening Committee's recommendations.

London Study Program

The Architecture Department participates in the London Study Program. Students and faculty live in London and use it as the site of design problems and as the base location for field trips.

The London Study Program is offered in the Spring Quarter. It is possible to get credit for fourth year Design, Practice and GEB areas C and D. Arrangements can be made for special studies for technical elective credit. Orientation meetings are scheduled each Fall Quarter.

San Francisco Urban Design Internship Program

This exciting program offers fourth year students the opportunity to live and study in San Francisco for one quarter (Fall or Spring). Each class utilizes real projects with the participation of talented, award-winning architectural offices and urban designers to introduce students to urban design and architectural practice in one of the world's most urbane cities.

Unique in its involvement of architectural students in public policy, this program won the American Institute of Architects Urban Design Award of Excellence in 1993. The two internships – architectural and urban design – provide the students with mentors, state-of-the-art knowledge, and access to outstanding architectural offices and professional resources. The case study methods is used to observe and analyze practice issues in the participating architectural firms.

Washington/Alexandria Center Consortium

The Washington/Alexandria Program is organized to offer a challenging and stimulating one-year option focusing on architecture. The Center functions as an extension of the College of Architecture of Virginia Polytechnic Institute and State University (VPI) in the Washington DC Metropolitan Area. This is a unique home for the Architectural Consortium, which is comprised of five universities including Cal Poly.

The Center seeks to explore and expand design pedagogues and design processes, establish collaboration with national and international institutions for new environmental strategies, and undertake demonstration projects seeking innovative architecture solutions. Orientation meetings are scheduled each Winter Quarter.

BACHELOR OF ARCHITECTURE

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

	Units
ARCH 101 Survey of Architectural Education and Practice	2
ARCH 106 Materials of Construction.....	3
ARCH 111 Introduction to Drawing and Perspective.	3
ARCH 112 Basic Graphics	3
ARCH 113 Graphics Analysis and Communication Skills.....	3
ARCH 207 Environmental Control Systems I.....	4
ARCH 231 Architectural Practice and Laboratory	3
ARCH 250 Computer Applications (F.1.)	3
ARCH 251, 252, 253 Architectural Design Fundamentals I, II, III	5,5,5
ARCH 307 Environmental Control Systems II	4
ARCH 317, 318, 319 History of Architecture.....	3,3,3
ARCH 341, 342 Architectural Practice	4,4
ARCH 351, 352, 353 Architectural Design.....	5,5,5
ARCH 407 Environmental Control Systems III	4
ARCH 420 Seminar in Architectural History	3
ARCH 441, 442 Professional Practice	3,3
ARCH 451, 452, 453 Architectural Design.....	5,5,5
ARCH 481 Senior Architectural Design Thesis Project	5,5,5
ARCH 491 Design Project.....	2
	<hr/> 120

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

ARCE 221 Elementary Structures	3
ARCE 222 Mechanics of Structural Members I	3
ARCE 226 Structural Systems for Architects	3
ARCE 321 Timber Design	3
ARCE 322 Steel Design.....	3
ARCE 323 Concrete and Masonry Design	3

EDES 101 Introduction to Architecture and Environmental Design	2
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II (B.2.)*	4
PHYS 131 General Physics (B.1.a.)*	4
PHYS 132 General Physics (B.1.a.)*	4
Upper division electives	9
CAED prefix professional electives	9
Environment-behavior adviser approved elective	3
Urban context adviser approved elective.....	3

60

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Support courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	2
A minimum of 18 units is required; 16 of the units are in Support	
Physical science (B.1.a.)* see Support Courses	
Life sciences elective (B.1.b.)	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	0
A minimum of 3 units is required; 3 of the units are in Major	
Computer literacy (F.1.)* see Major Courses	
Total.....	<hr/> 57
A minimum of 76 units is required; 19 of the units are in Support	
ELECTIVES.....	9

246

Recommended Sequence: Major and Support Courses

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
EDES 101	ARCH 106	ARCH 101
ARCH 111	ARCH 112	ARCH 113
MATH 141	MATH 142	PHYS 132
	PHYS 131	
2nd Year		
<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
ARCH 250	ARCH 231	ARCH 207
ARCH 251	ARCH 252	ARCH 253
ARCE 221	ARCE 222	ARCE 226
3rd Year		
<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
ARCH 341	ARCH 307	ARCH 342
ARCH 351	ARCH 352	ARCH 353
ARCH 317	ARCH 318	ARCE 323
ARCE 321	ARCE 322	
4th Year		
<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
ARCH 407	ARCH 441	ARCH 442
ARCH 451	ARCH 452	ARCH 453
ARCH 420	Electives	Prof Electives
		Urban Context Electives
5th Year		
<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
ARCH 491	ARCH 481	ARCH 481
ARCH 481	CAED Prof Electives	CAED Prof Electives
Upper Div Free Electives	Upper Div Free Electives	Upper Div Free Electives

ARCHITECTURAL MANAGEMENT TRACK

This program is available only to those students who are enrolled in Cal Poly's College of Architecture program. Students who fulfill all the requirements will first receive the Bachelor of Architecture and then the MBA. During the fifth year of the architecture program, students who have been admitted to this program are allowed to take GSB courses as outlined below. By April 15th of the 5th year, students must formally apply for admission to the MBA program. Acceptance to the MBA program is conditional upon the successful completion of the fifth year.

FIFTH YEAR ARCHITECTURE/FIRST YEAR MBA

	<i>Units</i>
Fall	17
1 ARCH 481 Design Lab (5)	
GSB 511 Financial Accounting (4)	
GSB 512 Quantitative Analysis (4)	
GSB 513 Organizational Behavior (4)	
Winter	17
1 ARCH 481 Design Lab (5)	
GSB 521 Managerial Accounting (4)	
GSB 522 Managerial Science (4)	
GSB 523 Managerial Economics (4)	
Spring	17
1 ARCH 481 Design Lab (5)	
GSB 531 Managerial Finance (4)	
GSB 532 Information Systems (4)	
GSB 534 Production and Operations Management (4)	

SIXTH YEAR ARCHITECTURE/SECOND YEAR MBA

Fall	16
GSB 524 Marketing Management (4)	
GSB electives (8)	
GSB or ARCH elective (4)	
Winter	16
GSB 514 Business, Government and Society (4)	
GSB electives (8)	
GSB or ARCH elective (4)	
Spring	16
GSB 533 Aggregate Economics (4)	
GSB 562 Business Strategy and Policy (4)	
GSB electives (8)	

¹ Or adviser approved electives..

MASTER OF SCIENCE IN ARCHITECTURE

Professional Practice Specialization

This specialization is for applicants holding an accredited architecture degree wishing to pursue advanced studies with a strong professional practice orientation.

The Master of Science in Architecture is a post-professional specialized degree in the broad field of architecture with an emphasis on professional practice. Common core studies aim to establish a central professional focus for advanced study and research, while sub-core studies and directed electives provide for the development of in-depth study chosen by candidates.

Environmental Design Specialization

This specialization is for applicants holding a degree in one of the several cognate environmental design disciplines, engineering, or computer science, wishing to pursue advanced studies with a strong inter-professional orientation. This is a post-professional specialized degree in the inter-professional field of environmental design, with special reference to its three primary contributory disciplines of Architecture, City and Regional Planning, and Landscape Architecture. The common core curriculum aims to establish a central focus for advanced study and research, while sub-core studies and directed electives provide for the development of in-depth study in one of the contributory disciplines of Architecture, City and Regional Planning, Architectural Engineering, Landscape Architecture and Construction Management.

CURRICULUM FOR M.S. ARCHITECTURE

	<i>Units</i>
Core Curriculum	34
ARCH 519 Theory of Architecture (3)	
ARCH 531 Habitability (3)	
ARCH 551 Architectural Design (10)	
ARCH 561 Advanced Design (9)	
ARCH 598 Master's Design Project (9) or	
ARCH 599 Master's Thesis (9) or	
A comprehensive examination with 9 additional	
units of approved graduate level coursework	
Directed Electives	11
A minimum of 6 units of adviser approved elective	
courses will be included in a student's formal	
program of study.	
	45

For further information contact the Graduate Program Coordinator, Department of Architecture, College of Architecture and Environmental Design, Cal Poly, San Luis Obispo, CA 93407.

See COURSES OF INSTRUCTION section of this catalog for description of courses in Architecture and other subjects.

CITY AND REGIONAL PLANNING DEPARTMENT

Dexter Bldg. (34), Room 251
(805) 756-1315

Faculty

Department Head, Linda C. Dalton

Linda L. Day	Joseph M. Kourakis
David T. Dubbink	Michael A. Smith-Heimer
William A. Howard	D. F. G. Williams

Programs

B.S. City and Regional Planning

M.C.R.P. Master of City and Regional Planning

M.C.R.P./M.S. Engineering

with Specialization in
Transportation Planning

City and Regional Planning emphasizes an understanding of urban and regional processes, supported by courses in computer applications, economics, management, natural environment, political science, and statistics. In addition, both the undergraduate and graduate programs offer an opportunity for students to apply their learning to practical situations in a series of laboratory courses, internships, and final student projects.

The degree programs prepare students for professional careers in the design of human settlements in harmony with the natural environment and the needs of society. Practicing planners work in public agencies and private consulting firms, preparing comprehensive plans for projects, neighborhoods, cities, and entire regions. They deal with the use of land, housing, transportation, public facilities, and open space. In addition, they are responsible for finding the means to make their plans become a reality by budgeting for public projects and programs and by reviewing and regulating private development.

The curriculum leading to the Bachelor of Science in City and Regional Planning provides a broad, interdisciplinary education as well as competency in physical planning with a specialization in urban and regional design. The Master of City and Regional Planning degree builds on a general undergraduate preparation in the humanities, social sciences or natural sciences, and offers two areas of emphasis: urban land planning and environmental planning.

B.S. CITY AND REGIONAL PLANNING

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

Units

MAJOR COURSES

CRP 101 Introduction to the Profession of City and Regional Planning.....	1
CRP 111 Introduction to Drawing and Perspective	3
CRP 112 Basic Graphics	3
CRP 201, 202 Environmental Design Fundamentals ..	3,3
CRP 203 Applied Design and Planning Fundamentals .	3
CRP 211 Introduction to Urbanization	3
CRP 212 Introduction to Urban Planning.....	3
CRP 213 Population and Housing Studies	3
CRP 214 Land Use and Transportation Studies	3
CRP 216 Computer Applications for Planning	3
CRP 314 Planning Theory	3
CRP 315 Economic and Fiscal Analysis for Planning .	3
CRP 347, 348 Urban and Regional Design	3,3
CRP 351, 352, 353 Community Planning Lab	4,4,4
CRP 409 Planning Internship.....	2
CRP 420 Planning Law	4
CRP 430 Planning Administration	3
CRP 451, 452 Regional and Environmental Planning Lab.....	4,4
CRP 461, CRP 462 Senior Project	2,2
CRP 463 Undergraduate Seminar.....	2
Adviser approved electives	13
	<hr/> 91

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

CSC 110 Computers and Computer Applications (F.1.)*	3
ECON 211 Principles of Economics (D.3.)*	3
ECON 212 Principles of Economics	3
EDES 101 Introduction to Architecture and Environmental Design	2
FNR 304/CONS 311	4/3
GEOL 201 Physical Geology (B.1.a.)*	3
LA 213 Site and Terrain Analysis	4
MATH 118 Pre-Calculus Algebra (B.2.)*	4
MGT 317/POLS 441/PSY 302	4/3
POLS 401/403/405.....	4
STAT 211 Elementary Probability & Statistics (B.2.)* ..	3
STAT 212 Statistical Methods (B.2.)*	3

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 218 (A.4.)	
Area B:	5
<i>A minimum of 18 units is required; 13 of the units are in Support</i>	
Physical or life sciences elective (with lab) (B.1.)	
Physical science (B.1.a.)* see Support Courses	
Life science elective (B.1.b.)	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	15
<i>A minimum of 18 units is required; 3 of the units are in Support</i>	
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
Economics (D.3.)* see Support Courses	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	0
<i>A minimum of 3 units is required; 3 of the units are in Support</i>	
Computer literacy (F.1.)* see Support Courses	
Total	57
<i>A minimum of 76 units is required; 19 of the units are in Support</i>	

ELECTIVES 10–12

Recommended Sequence: Major and Support Courses

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
Fall	Winter	Spring
EDES 101	CRP 111	CRP 112
CRP 101	CRP 212	CSC 110
	MATH 118	GEOL 201
2nd Year		
Fall	Winter	Spring
CRP 201	CRP 202	CRP 203
CRP 211	CRP 213	CRP 214
STAT 211	STAT 212	CRP 216
ECON 211	ECON 212	FNR 304 or
	LA 213	CONS 311
3rd Year		
Fall	Winter	Spring
CRP 347		CRP 348
CRP 315	CRP 314	
CRP 351	CRP 352	CRP 353
CRP electives	CRP electives	CRP electives
		POLS 401 or
		403 or 405
Summer: CRP 409		
4th Year		
Fall	Winter	Spring
CRP 463	CRP 461	CRP 462
CRP 451	CRP 452	
CRP 420	CRP 430	CRP electives
MGT 317 or		
POLS 441 or		
PSY 302		

Master of City and Regional Planning

General Characteristics

The Master of City and Regional Planning degree program (MCRP) is professionally oriented and is open to students with high standards of academic achievement who wish to pursue careers in city and regional planning. It is structured to prepare graduates with competence to function in a general context of planning, as well as in a particular area of emphasis. The MCRP core courses cover planning theory, methods, law, formulation and implementation of plans and policies.

Two principal areas of study are emphasized: urban land planning, focused on comprehensive physical planning and urban design; and environmental planning, focused on natural systems and development impacts. In addition, the City and Regional Planning Department jointly offers the MCRP degree with the Master of Science in Engineering with a specialization in transportation planning (see page 187).

The master's program is structured to meet the needs of those who have earned baccalaureate degrees in a variety of disciplines including, but not limited to, economics, geography, architecture, landscape architecture, civil engineering, political science, environmental or urban studies, natural resources management, and ecology. The program is six quarters (two years) in duration and consists of 72 approved units (not including courses necessary to compensate for deficiencies). Because of the sequencing of courses, students admitted to the program are expected to begin their studies in the fall quarter. Students with prerequisite coursework deficiencies and those with backgrounds allowing waivers of first-year core courses may be admitted in other quarters. The degree culminates in a thesis (CRP 599), or synthesis course (CRP 597) and comprehensive exam.

The MCRP Program offers students an opportunity to develop close working relationships with the planning faculty. Self-directed study, tailored to the student's interests and needs, is also encouraged.

Prerequisites

Students entering the MCRP Program are expected to bring with them a background in certain basic subject areas or to make up deficiencies in these basic subject areas after admission. These include the following Cal Poly courses or their equivalents:

STAT 211 Elementary Probability and Statistics
CSC 110 Computers and Computer Applications

Applicants for admission to the Master of City and Regional Planning program are expected to:

1. Have earned a bachelor's degree from an accredited university or college,
2. Have attained a grade point average of 3.0 in last 90 units of undergraduate work,

3. Provide the CRP Graduate Review Committee with the results of the Graduate Record Examination Aptitude Test,
4. Give indications of motivation, maturity, and high standards of academic involvement through work and references (three letters required) and submission of a project or paper demonstrating writing ability,
5. Provide a statement (maximum of 300 words) addressing your understanding of and areas of interest in city and regional planning, your career objectives, and your educational objectives.

Applicants lacking prerequisites or other background requirements for classified standing requirements may be admitted on a conditionally classified basis, depending on the results of an individual analysis of their applications.

Units

Core Courses 50/52
First Year

CRP 501 Foundations of Cities and Planning (4)
CRP 510 Planning Theory (4)
CRP 513 Planning Research Methods (4)
CRP 514 Computer Applications for MCRP (2)
CRP 515 Presentation and Communication
Techniques for Planners (3)
CRP 516 Quantitative Methods in Planning (4)
CRP 518 Policy Analysis for Planners (4)
CRP 525 Plan Implementation (4)
CRP 552 Community Planning Laboratory (4)

Second Year

CRP 409 Planning Internship (2)
CRP 420 Planning Law (4)
CRP 530 Planning Agency Management (3)
CRP 554 Regional Planning and Analysis (4)
CRP 597 Policy, Planning, and Management (4) and
comprehensive exam or
CRP 599 Thesis/Project (6)

Emphasis Area (select one) 15
Urban Land Planning

CRP 520 Feasibility Studies in Planning (4)
CRP 548 Principles of City Design (3)
CRP 553 Project Planning Laboratory (4)
Urban electives (4)

Environmental Planning

CRP 407 Environmental Law (3)
CRP 545 Environmental Planning, Policies and
Principles (4)
Environmental electives (8)

Adviser approved electives 7/5

Joint MCRP/MS Engineering with Specialization in Transportation Planning

The Transportation Planning Specialization is a joint interdisciplinary program between the College of Engineering and the College of Architecture and Environmental Design. Participation in the program requires enrollment in both Colleges. Participants successfully completing the program will be awarded both the M.C.R.P. and the M.S. in Engineering, each with a Specialization in Transportation Planning.

The major objectives of this joint program are:

- To provide an interdisciplinary graduate program which combines elements of transportation planning with city and regional planning to address a need for professionals who have a command of both the technology of transportation planning and the place of transportation within the urban environment. The required master's project is intended to allow the students a period of directed study that will allow them to integrate their work and to apply this to special areas of their choosing.
- To provide planners with courses essential to understanding the technologies of transportation planning. To provide engineers with a broad background in urban studies and a knowledge of contemporary environmental issues.
- To take advantage of the backgrounds of program participants. The graduate students of both sponsoring departments include both mature professionals returning for advanced degrees and recent graduates with a diversity of specializations.

Prerequisites

Applicants must have satisfactorily completed courses that cover the following or equivalent subject areas:

CE 221 Fundamentals of Transportation Engineering
CE 381 Geotechnical Engineering or
GEOL 201 Physical Geology
CSC 251 Digital Computer Applications
ECON 211 Principles of Economics
ENGL 218 Professional Writing: Argumentation &
Reports
MATH 143 Calculus
PHYS 131 General Physics
SPC 201 Public Speaking
STAT 321 Statistical Analysis I

Applicants for admission to the joint program with a specialization in Transportation Planning are expected to:

- Have earned a bachelor's degree from an accredited university or college,
- Have attained a grade point average of 3.0 in last 90 units of undergraduate work,
- Provide results of the Graduate Record Examination (GRE) Aptitude Test to the Admissions Committee.

- Give indications of motivation, maturity, and high standards of academic involvement through work and references (three letters required) and submission of a project or paper demonstrating writing ability,
- Provide a statement (maximum of 300 words) addressing their understanding of and areas of interest in planning, career objectives, and educational objectives.

Applicants lacking prerequisites or other background requirements for classified standing may be admitted on a conditionally classified basis, depending on the results of an individual analysis of their applications.

Core Courses 68

CE 523 Transportation System Planning (4)
CE 528 Transportation Analysis or
CE 525 Airport Planning and Design (4)
CE 571 Selected Advanced Laboratory (3)
CE 574 Computer Applications in C.E. (3)
CE 591 Graduate Seminar (2)
CE 599 or CRP 599 Project /Thesis (2,2,2)
CRP 409 Planning Internship (2)
CRP 420 Planning Law (4)
CRP 435 Transportation Theory (3)
CRP 501 Foundations of Cities and Planning (4)
CRP 510 Planning Theory (4)
CRP 513 Planning Research Methods (4)
CRP 515 Presentation and Communication
Techniques for Planners (3)
CRP 516 Quantitative Methods in Planning (4)
CRP 518 Policy Analysis for Planners(4)
CRP 525 Plan Implementation (4)
CRP 530 Planning Agency Management (3)
CRP 552 Urban Planning Laboratory (4)
CSC, MATH, STAT or other approved quantitative
methods course (3)

Emphasis Area (select one of the following) 14

Urban Land Planning Emphasis

CRP 520 Feasibility Studies in Planning (4)
CRP 548 Principles of City Design (3)
CRP 553 Project Planning Laboratory (4)
Urban Land Planning electives (3)

Regional and Environmental Planning Emphasis

CRP 407 Environmental Law (3)
CRP 545 Environmental Planning, Policies and
Principles (4)
Regional and Environmental Planning electives (7)

Approved CE/ENVE electives: 8

Electives may include: CE 422, 424, 522, 525, 527,
528, 529, 573; ENVE 411, 465

CONSTRUCTION MANAGEMENT DEPARTMENT

Engineering West (21), Room 116-A
(805) 756-1323

Faculty

Department Head, James A. Rodger

Harold A. Johnston

Matthias R. Wall

Program

B.S. Construction Management

The curriculum in Construction Management leads to the Bachelor of Science degree which is accredited by the American Council for Construction Education. Major emphasis is placed on organizing and managing the construction phase of society's efforts to improve the environment. The constructor is an important member of the building team and requires a professional knowledge of techniques, materials, equipment, job planning and cost control to add to the contributions of the planning and design professions. Graduates of this program can help supply the urgent needs of the construction industry and its related fields.

B.S. CONSTRUCTION MANAGEMENT

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

	Units
MAJOR COURSES	
CM 321 Concrete Technology.....	3
CM 331 Construction Cost Control.....	3
CM 332 Cost Alternatives Evaluation	4
CM 333 Construction Contract Administration	3
CM 341 Residential and Light Commercial Construction Practices	3
CM 342 Commercial, Institutional and Industrial Construction Practices	3
CM 343 Earthwork and Civil Works Construction Practices	3
CM 352, 353 Building Support System Construction Practices	5,5
CM 364 Project Administration	3
CM 443 Principles of Construction Management	3
CM 444 Concrete Formwork and Temporary Structures	3
CM 445 Principles of Heavy Construction	2
CM 452 Project Controls	4
CM 453 Project Development.....	4
CM 454 Building Estimating.....	4
CM 461 Senior Project.....	2
CM 462 Senior Project.....	1
ARCE 221 Elementary Structures.....	3
ARCE 222 Mechanics of Structural Members I.....	3
ARCE 226 Structural Systems for Architects.....	3
ARCH 106 Materials of Construction	3
ARCH 111 Introduction to Drawing and Perspective .	3
EDES 311 Construction Contract Documents	5
	<hr/> 78

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

AE 237 Engineering Surveying.....	2
ARCE 321 Timber Design.....	3
ARCE 322 Steel Design.....	3
ARCE 323 Concrete and Masonry Design.....	3
ARCE 421 Soil Mechanics	3
ACTG 211 Financial Accounting for Nonbusiness Majors	4
BUS 201 Business Law Survey	3
CHEM 121 General Chemistry	4
CRP 212 Introduction to Urban Planning.....	3

EDES 101 Introduction to Architecture and Environmental Design	2
ENGL 310 Corporate Communications	4
GEOL 201 Physical Geology	3
LA 212 Site Analysis	3
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II (B.2.)*	4
PHYS 131 General Physics (B.1.a.)*	4
PHYS 132 General Physics (B.1.a.)*	4
300–400 level MGT or FIN elective	4
	<hr/> 60

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	2
A minimum of 18 units is required; 18 of the units are in Support.	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)	
BIO 220 recommended for B.1.b. and E.2.	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (C.3.) (ARCH 318 recommended)	
Arts and humanities elective (Area C) (ARCH 319 recommended)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
A minimum of 5 units is required, 2 of the units are in Support	
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E. 2.)	
BIO 220 recommended for E.2. and B.1.b.	
Area F:	3
ARCH 250/CSC 110 (F.1.)	
Total	<hr/> 60
A minimum of 76 units is required; 20 of the units are in Support	
ELECTIVES	0

198

Recommended Sequence: Major and Support Courses

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
Fall	Winter	Spring
EDES 101	ARCH 106	ARCH 111
MATH 141	MATH 142	PHYS 132
	PHYS 131	
2nd Year		
Fall	Winter	Spring
ARCE 221	ARCE 222	ARCE 226
CRP 212	LA 212	EDES 311
CHEM 121	ACTG 211	GEOL 201
AE 237		
BUS 201		
3rd Year		
Fall	Winter	Spring
ARCE 321	ARCE 322	ARCE 323
CM 341	CM 342	CM 343
CM 352	CM 353	CM 364
CM 331	CM 332	CM 333
ENGL 310		CM 321
4th Year		
Fall	Winter	Spring
ARCE 421	CM 444	CM 445
CM 443	CM 453	CM 454
CM 452	CM 462	
CM 461	300 Level MGT or FIN	

LANDSCAPE ARCHITECTURE DEPARTMENT

**Dexter Bldg.(34), Room 251
(805) 756-1319**

Faculty

Department Head, Walter D. Bremer

Brian A. Aviles	Roger J. Osbaldeston
Gary C. Dwyer	Gerald L. Smith
Omar Faruque	Dale A. Sutliff
Alice C. Loh	Walter M. Tryon

Programs

Bachelor of Landscape Architecture

with Concentrations in:

Environmental Design

Recreation and Open Space

Regional Landscape Assessment

The profession of landscape architecture is primarily involved with the design, planning, and protection of the natural and developed environments. The program in landscape architecture is accredited by the American Society of Landscape Architects and recognized by the California State Board of Landscape Architects.

An emphasis is placed on a process oriented approach to design and planning while developing an awareness and sensitivity to community and human values as they relate to environmental conditions. Students majoring in landscape architecture will acquire technical competencies and creative design skills through a range of projects which represent the breadth of the profession. Please consult with departmental advisers for details.

Graduates of the program are prepared for positions in private practice, consulting, governmental agencies at the national, state or local levels, industry and construction firms. Graduate study is encouraged for those students interested in pursuing advanced studies.

Majors who are in their last two years of study and have at least a 3.2 grade point average may have the opportunity to join Theta Chapter of Sigma Lambda Alpha, the national scholastic honor society for landscape architecture.

Curricular Concentrations

Environmental Design

Allows for in-depth study of various foci within the landscape architecture discipline, including current and future design explorations and thinking, design/build, environmental art, design theory, professional practice, etc. Design studios are

structured to permit research and application of the concentration focus.

Recreation and Open Space

Allows for in-depth study of the roles, relationships, methods and directions of planning and design for recreation and open spaces in various settings and scales, from specific sites to communities, cities and regional systems. Design studios are structured to permit research and application of the concentration focus.

Regional Landscape Assessment

Allows for in-depth study of current and emerging methods for environmental assessment and planning using computer applications and other complementary technologies and approaches. Design studios are structured to permit research and application of the concentration focus.

BACHELOR OF LANDSCAPE ARCHITECTURE

Courses are displayed by Major, Support, Concentration, General Education and Breadth, and Electives.

MAJOR COURSES

	Units
LA 110 Graphic Communication for Landscape Architects	3
LA 111 Three Dimensional Graphics for Landscape Architects	4
LA 114 Landscape Analysis and Planning	4
LA 201 Survey of Landscape Architecture	2
LA 231 Landscape Architecture Construction	3
LA 251 Fundamentals of Design and Planning in Landscape Architecture	4
LA 252 Fundamentals of Site Planning and Design ...	4
LA 253 Applied Design and Planning Fundamentals.	5
LA 300 Internship	3
LA 310 Introduction to Computing in Landscape Architecture	2
LA 311 History of Landscape Architecture	3
LA 320 Design Theory for Landscape Architects	3
LA 321 Concepts in Environmental Decision Making	3
LA 323 History of Twentieth Century Landscape Architecture	3
LA 351, 352, 353 Design for Landscape Architects ..	5,5,6
LA 441, 442 Professional Practice I, II	2,2
LA 451 Regional Landscape Assessment.....	6
LA 452 Urban Design for Landscape Architects	5
LA 454, 455, 456 Design for Landscape Architects ..	4,4,4
LA 461 Senior Design Project	5
LA 464 Senior Seminar	1,1,1
LA elective	3
Concentration courses (see below).....	18

118

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

AE 237 Engineering Surveying	2
AE 337 Landscape Irrigation	3
ARCE 311 Structures for Landscape Architects	3
ARCH 317 History of Architecture (C.3.)*	3
BIO 128 Natural History: Animal Communities (B.1.)*	3
BOT 121 General Botany (B.1.b.)*	4
BOT 238 Native Plant Materials	3
CM 325 Construction Management Practice.....	3
CRP 212 Introduction to Urban Planning	3
EDES 101 Introduction to Architecture and Environmental Design	2
MATH 120 Pre-Calculus Algebra and Trig. (B.2.)* ...	5

OH 231 Plant Materials	4
OH 232 Plant Materials	4
SS 121 Introductory Soil Science	4
STAT 211 Elementary Probability & Statistics (B.2.)* .	3

49

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	3
<i>A minimum of 18 units is required; 15 of the units are in Support</i>	
Physical science elective (B.1.a.)	
Life science (B.1.b.)* see Support Courses	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	15
<i>A minimum of 18 units is required; 3 of the units are in Support</i>	
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts (C.3.)* see Support Courses	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	3
Computer literacy elective (F.1.)	
Total	58
<i>A minimum of 76 units is required; 18 of the units are in Support</i>	

ELECTIVES..... 11

236

CONCENTRATIONS (select one)**Environmental Design**

LIB 301 Library Resources and Literature Searches ...	1
LA 483 Special Studies in Architecture	12
Adviser approved electives.....	5
	18

Recreation and Open Space

LA 363 Recreation and Open Space Planning and Design	3
LA 411 Regional Landscape History.....	3
LA 481 Visual Resource Management Methods.....	3
LA 482 Evaluation Methods in Environmental Design	3
Adviser approved electives.....	6
	18

Regional Landscape Assessment

LA 411 Regional Landscape History.....	3
LA 481 Visual Resource Management Methods.....	3
LA 482 Evaluation Methods in Environmental Design	3
CRP 404/FNR 404 Environmental Law	3
Adviser approved electives.....	6
	18

Recommended Sequence: Major and Support Courses

The following is a guide for scheduling Major and Support Courses. By following this sequence, students should meet prerequisites for Major coursework. Courses are not always offered during the quarter indicated. Please consult with your academic adviser and the current Class Schedule.

1st Year		
Fall	Winter	Spring
LA 110	LA 111	LA 114
EDES 101	BIO 128	BOT 238
BOT 121		SS 121
2nd Year		
Fall	Winter	Spring
LA 251	LA 231	LA 253
LA 201	LA 252	OH 231
LA 311	LA 310	ARCH 317
AE 237	LA 323	
3rd Year		
Fall	Winter	Spring
ARCE 311	LA 352	LA 353
LA 351	AE 337	LA 321
OH 232	CRP 212	CM 325
LA 320		
Summer: LA 300		
4th Year		
Fall	Winter	Spring
LA 441	LA 442	LA 461
LA 451	LA 452	LA elective
5th Year		
Fall	Winter	Spring
LA 464	LA 464	LA 464
LA 454	LA 455	LA 456
Major concentration	Major concentration	Major concentration
Major concentration	Major concentration	Major concentration



BUSINESS BUILDING

The new Business Building was completed in February 1993. The College's Dean, department offices, and faculty are located here. The building also includes "state-of-the-art" lecture rooms and computer labs.
Photo by Doug Allen.

College

of

BUSINESS

College of Business

Business Bldg. (03), Room 455
(805) 756-2704

Allen Haile, Dean

Department/Location:	Program:
	Business: Minor Business Administration: MBA
Business/Engineering	Engineering Management: MBA/MS
Accounting, Business Administration, Management	Business Administration: BS
Economics	Economics: BS, Minor
Industrial Technology	Industrial Technology: BS Industrial and Technical Studies: MS Integrative Technology: Minor Packaging: Minor

The mission of the College of Business at Cal Poly is to create a dynamic educational environment, which inspires students to think effectively, take responsible action, and make a positive impact on business and society. We strive for excellence in teaching and in the development, refinement, application, and dissemination of knowledge.

Guiding Principles

- Above all else, we base our actions upon their positive impact on the human condition.
- We act with integrity.
- We aim to continuously improve our understanding of the learning process in order to consistently provide educational programs of the highest quality.
- We are committed to maintaining the highest quality undergraduate program, while continually exploring further opportunities to deliver education of exceptional quality to students throughout their lives.
- We endeavor to develop life long competencies rather than mastery of specific information.
- We subscribe to the philosophy of learning by doing. "One must learn by doing the thing; for though you think you know it you have no certainty, until you try." (Sophocles, 445 B.C.)

- As a college in a polytechnic university, we seek to develop and use our special competencies in current and emerging technologies.
- We enrich our programs by drawing from and contributing to the sciences and the humanities.
- We encourage interdisciplinary teamwork and promote interaction among academia, business, industry, government, and society.
- We value individual strengths, creativity, and inventiveness and believe that individuals will contribute to the realization of our mission in different ways.
- We value service to students, the university, the community, and to academic and professional associations.

The B.S. degree program in Business Administration and the Master of Business Administration are accredited by the American Assembly of Collegiate Schools of Business. The B.S. degree program in Industrial Technology is accredited by the National Association of Industrial Technology. The objective of accreditation is to foster high quality in educational programs.

The college is organized into five departments: Accounting, Business Administration, Economics, Industrial Technology and Management. This organizational structure allows for traditional programs of study in each of the functional fields of business and economics, and also allows for ease of coordination in the offering of programs that require study from a cross-section of these disciplines. A pre-law advisement service is available to all university students.

The college's educational philosophy follows the Cal Poly tradition—that of enlisting maximum student involvement in the learning process through case analysis, special projects, internships, computer simulations and other learn-by-doing exercises. The college has state-of-the-art computer facilities which are available to students to meet their coursework needs. Educational programs are designed to help the student achieve maximum personal development, to prepare the student for entry into the business world, and to foster citizenship, leadership, and constructive community living. The curricula include general education requirements and specialized studies in the student's major field. Optional areas of concentration within each major enable the student to select the program most closely suited to the chosen career field.

CURRICULUM FOR BUSINESS MINOR

The Business Minor provides non-business students with an introduction to the body of knowledge expected of persons pursuing careers in business. A business minor will give a student a competitive edge when applying for certain jobs, by providing concepts, tools and skills which will enhance one's progress in a career. In addition, students who plan on a career in the non-business sector will gain a greater appreciation of the challenges and opportunities facing business, now and in the future.

Enrollment in the Business Minor is limited, and selection will be made based upon the applicant's performance in the prerequisite courses listed below. After admission to the Minor, the student must complete the remaining required courses. At least 16 units must be completed *after* admission to the program.

Prerequisites

The following courses must be taken *before* admission to the minor. Since admission is competitive, selection will be based on performance in these courses.

ACTG 211 Financial Accounting for Nonbusiness Majors
(4) or ACTG 224 Financial Accounting (5)
BUS 207 Business Law (4)
ECON 221 Microeconomics (4)
ECON 222 Macroeconomics (D.3.) (4)
MATH 124 Finite Mathematics (B.2.) (3)
STAT 251 Statistical Inference for Management I (B.2.) (4)
STAT 252 Statistical Inference for Management II (B.2.) (4)

Required courses

The following courses comprise the Business Minor. At least 16 units must be completed *after* admission to the minor.

¹ ACTG 211 Financial Accounting for Nonbusiness Majors or ACTG 224 Financial Accounting	4/5
ACTG 225 Managerial Accounting	4
¹ BUS 207 Business Law	4
FIN 342 Financial Management.....	4
MGT 312/MGT 314/MGT 317	4
MIS 321 Management Information Systems or MGT 301 Production and Operations Management	4
MKTG 301 Principles of Marketing	4
	<hr/> 28/29

¹ These courses will have been taken prior to admission to the Business Minor, but will count as part of the Business Minor.

Master of Business Administration

General Characteristics

The Cal Poly MBA program is designed to prepare students to enter successful management positions of high responsibility. The program is based on the recognition that future business leaders must function in an environment (a) that places more emphasis on technology, (b) that is facing more globalization in markets and organizations, and (c) that is placing increased importance on societal factors such as pollution, equal rights, ethical behavior and corporate citizenship. The primary objectives of the MBA program are:

- To provide students with a broad-based understanding of fundamental concepts, principles and practices in multiple business disciplines;
- To instill in students an integrated understanding of business dynamics for effective responses to the changing global business environment;
- To help the students acquire skills in formulating, analyzing and implementing significant business decisions; and
- To develop in students the skills that are necessary to work with other people in effective organizations in a changing global environment.

Prerequisites

With the exception of prior background in quantitative analysis, there are no specific prerequisite courses for the MBA program. See the MBA curriculum for details.

Admission to the MBA Program:

Admission to the MBA program is based upon:

- Successful completion of an accredited undergraduate program of study;
- The student's undergraduate record, with particular emphasis placed on performance during the last 90 units (or equivalent);
- Achievement on the Graduate Management Admission Test (GMAT); and
- Prior work experience.

For more information on the MBA Program and for application materials specific to the program, please contact the office of Graduate Programs, College of Business.

Program of Study

The MBA program entails a two-year program of graduate work. The first year of the program offers students an integrated understanding of concepts and tools of the various business disciplines. The courses offered contain material that is commonly referred to as the core of business knowledge. The first year provides a collaborative learning environment in which future business managers can acquire basic knowledge and skills in all business disciplines. Ethical

and international business issues are specifically addressed in many courses.

The second year of the program consists primarily of elective courses. This structure is based on the belief that people learn best when their past experiences and training can be made an integral part of the learning process. Various sequences of elective courses are offered to allow students to specialize in particular fields. Students are also permitted to develop their own sequences of elective courses. Because the intent is to provide the training and education necessary for the MBA graduate to be successful, the second year elective sequences undergo continuous review for currency and relevance. Satisfactory completion of a comprehensive examination (incorporated into GSB 562) is a requirement of the MBA program.

FIRST YEAR	Units
Students are encouraged to challenge first-year GSB courses based on their previous work.	
Fall	16
GSB 511 Financial Accounting (4)	
GSB 512 Quantitative Analysis (4)	
GSB 513 Organization Behavior (4)	
GSB 524 Marketing Management (4)	
Winter	16
GSB 521 Managerial Accounting (4)	
GSB 522 Management Science (4)	
GSB 523 Managerial Economics (4)	
GSB 514 Business, Government and Society (4)	
Spring	16
GSB 531 Managerial Finance (4)	
GSB 532 Information Systems (4)	
GSB 533 Aggregate Economics (4)	
GSB 534 Production and Operations Mgmt. (4)	

SECOND YEAR

Students must select from: GSB 578, GSB 587, BUS 490, ECON 401, MKTG 401, or AGB 563 to satisfy one of the following four-unit GSB electives
As a policy, MBA students will not be permitted to take more than two classes at the 400 level.

Fall	16
GSB Electives (16)	
Winter	16
GSB Electives (16)	
Spring	16
GSB 562 Business Strategy and Policy (4)	
GSB Electives (12)	

MBA, SPECIALIZATION IN AGRIBUSINESS

This specialization is offered in conjunction with the Agribusiness Department, College of Agriculture. It requires the completion of six graduate courses taught by the Agribusiness Department. These courses are taken in lieu of electives in the MBA program. Satisfactory completion of a comprehensive examination is required. The MBA Agribusiness Specialization is designed for those interested in agribusiness management careers. Graduates will be prepared for large farm and ranch management as well as for positions in supporting agribusiness industries such as commodity marketing or food processing.

FIRST YEAR*Units*

Students are encouraged to challenge first-year GSB courses based on their previous work.

Fall	16
GSB 511 Financial Accounting (4)	
GSB 512 Quantitative Analysis (4)	
GSB 513 Organization Behavior (4)	
AGB 514 Agribusiness Managerial Leadership and Communication (4)	
Winter	16
GSB 521 Managerial Accounting (4)	
GSB 522 Management Science (4)	
GSB 523 Managerial Economics (4)	
GSB 514 Business, Government and Society (4)	
Spring	16
GSB 531 Managerial Finance (4)	
GSB 532 Information Systems (4)	
GSB 533 Aggregate Economics (4)	
GSB 534 Production and Operations Mgmt. (4)	

SECOND YEAR

Students must select from: GSB 578, BUS 490, ECON 401, MKTG 401, or AGB 563 to satisfy one of the following four-unit GSB electives.

As a policy, students will not be permitted to take more than two classes at the 400-level.

Fall	16
GSB 524 Marketing Management (4)	
AGB 543 Ag. Policy and Program Analysis (4)	
GSB electives (8)	
Winter	16
AGB 554 Managing Price Risk in Agribusiness (4)	
AG 539 Graduate Internship in Agriculture (4)	
AGB 555 Technological and Economic Change in Agribusiness (4)	
GSB elective (4)	
Spring	16
GSB 562 Business Strategy and Policy (4)	
AGB 563 International Agricultural Trade and Market Development (4)	
GSB electives (8)	

96

ARCHITECTURAL MANAGEMENT TRACK

This program is available only to those students who are enrolled in Cal Poly's College of Architecture program. Students who fulfill all the requirements will first receive the Bachelor of Architecture and then the MBA. During the fifth year of the architecture program, students who have been admitted to this program are allowed to take GSB courses as outlined below. By April 15th of the 5th year, students must formally apply for admission to the MBA program. Acceptance to the MBA program is conditional upon the successful completion of the fifth year.

FIFTH YEAR ARCHITECTURE/FIRST YEAR MBA*Units*

Fall	17
¹ ARCH 481 Design Lab (5)	
GSB 511 Financial Accounting (4)	
GSB 512 Quantitative Analysis (4)	
GSB 513 Organizational Behavior (4)	
Winter	17
¹ ARCH 481 Design Lab (5)	
GSB 521 Managerial Accounting (4)	
GSB 522 Managerial Science (4)	
GSB 523 Managerial Economics (4)	
Spring	17
¹ ARCH 481 Design Lab (5)	
GSB 531 Managerial Finance (4)	
GSB 532 Information Systems (4)	
GSB 534 Production and Operations Management (4)	

SIXTH YEAR ARCHITECTURE/SECOND YEAR MBA

Fall	16
GSB 524 Marketing Management (4)	
GSB electives (8)	
GSB or ARCH elective (4)	
Winter	16
GSB 514 Business, Government and Society (4)	
GSB electives (8)	
GSB or ARCH elective (4)	
Spring	16
GSB 533 Aggregate Economics (4)	
GSB 562 Business Strategy and Policy (4)	
GSB electives (8)	

99

¹ Or adviser approved electives.

Joint M.B.A./M.S. Engineering with Specialization in Engineering Management

The joint Engineering Management specialization is an interdisciplinary program linking the MBA and MS in Engineering degree programs. It is a cooperative effort between the College of Engineering (Industrial Engineering Department) and the College of Business. Students are required to have a prerequisite degree in engineering, computer science, or similar technical degree to be admitted to both the College of Engineering and the College of Business, and to be enrolled in both degree programs. Successful participants will be awarded both MBA and MS in Engineering degrees each with a specialization in Engineering Management.

The three major objectives are:

- 1) to integrate knowledge and skills from engineering and business disciplines for effective responses to rapidly changing technological and business environments;
- 2) to prepare engineers for effective participation in management of technology, management of technology-based organizations, and management of technological change; and
- 3) to take advantage of the unique background of program participants and the unique strengths of Cal Poly.

Units

FIRST YEAR

Students are encouraged to challenge any of the following first-year GSB courses based on previous work.

Fall	15-16
GSB 511 Financial Accounting (4)	
GSB 513 Organization Behavior (4)	
GSB 524 Marketing Management (4)	
¹ Technical Elective (3-4)	
Winter	16
GSB 521 Managerial Accounting (4)	
GSB 522 Management Science (4)	
GSB 523 Managerial Economics (4)	
IME 557 Technological Assessment and Planning (4)	
Spring	16
GSB 531 Managerial Finance (4)	
GSB 532 Information Systems (4)	
GSB 533 Aggregate Economics (4)	
GSB 534 Production and Operations Management (4)	
Summer	8
GSB 598 Graduate Internship in Business (8)	

SECOND YEAR

Students must select from GSB 578, GSB 587, BUS 490, ECON 401, or MKTG 401 to satisfy one of the following four-unit GSB electives.

Fall	13-15
IME 545 Advanced Topics in Simulation (3)	
¹ GSB elective or technical elective (3-4)	
¹ GSB elective (4)	
¹ Technical elective (3-4)	
Winter	16
GSB 514 Business Government and Society (4)	
IME 555 Computer Integrated Manufacturing (4)	
IME 558 Engineering Decision Making (4)	
¹ GSB elective (4)	
Spring	15-16
GSB 562 Business Strategy and Policy (4)	
IME 556 Technological Project Management (4)	
¹ GSB elective (4)	
¹ Technical Elective (3-4)	
Summer	8
¹ GSB electives (4) (4)	
Minimum total units required	<u>107</u>

¹ Technical electives to be selected with College of Engineering adviser's approval. GSB electives to be selected with College of Business adviser's approval.

ACCOUNTING DEPARTMENT

**Business Bldg. (03), Room 403
(805) 756-1384**

Faculty

Department Head, John C. Robison

James A. Anderson	Janice L. Carr
Charles T. Andrews	Douglas C. Cerf
Mary Beth Armstrong	M. Zafar Iqbal
Lawrence E. Baur, Jr.	Earl C. Keller
William C. Boynton	Charles R. (Tad) Miller

Program

B.S. Business Administration

with Concentration in:
Accounting

The primary objectives of the Accounting Department are to:
1) provide students within the College of Business with the ability to understand and interpret accounting information that is relevant to business decisions; 2) prepare students for careers as professional accountants; and 3) provide students from other colleges within the university with an introduction to accounting and its uses.

CURRICULAR CONCENTRATION

Accounting

This concentration prepares students for accounting careers in public accounting, industry, and government. The concentration builds on the principles of financial and managerial accounting coursework (ACTG 224 and ACTG 225) included in the core program of the business major. The concentration requires 28 additional units of accounting study consisting of 20 required units and 8 units of accounting electives. The elective courses afford students an opportunity to pursue further study in cost accounting, micro-computer applications, and taxation.

B.S. BUSINESS ADMINISTRATION

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

	Units
ACTG 224 Financial Accounting	5
ACTG 225 Managerial Accounting	4
ACTG 461 Senior Project	1
ACTG 462 Senior Project	3
BUS 207 Business Law	4
BUS 404 Government and Social Influences on Business	4
FIN 342 Financial Management	4
MGT 301 Production and Operations Management ..	4
MGT 317 Organizational Behavior	4
International business	
Select one from: MGT 406, ACTG 453, BUS 490, MKTG 401, FIN 430 or ECON 401	4
MGT 414 Business Strategy and Policy Seminar	4
MIS 321 Management Information Systems	4
MKTG 301 Principles of Marketing	4
Concentration courses	28

77

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

CSC 120 Principles of Business Data Processing (F.1.)*	4
ECON 221 Microeconomics	4
ECON 222 Macroeconomics (D.3.)*	4
ECON elective (300–400 level)	4
MATH 124 Finite Mathematics (B.2.)*	3
MATH 221 Calculus for Business and Economics (B.2.)*	4
STAT 251 Statistical Inference for Mgmt. I (B.2.)*	4
STAT 252 Statistical Inference for Mgmt. II	4

31

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	

Area B: 7
A minimum of 18 units is required; 11 of the units are in Support

Physical and life sciences electives (one with lab) (B.1.)

Mathematics/statistics (B.2.)* see Support Courses

Area C: 18

PHIL 230/PHIL 231 (C.1.)

Critical reading electives (C.1.)

Fine and performing arts elective (C.2.)

Literature, philosophy, arts elective (300–400 level) (C.3.)

Arts and humanities elective (Area C)

Area D: 14

A minimum of 18 units is required; 4 of the units are in Support

HIST 204 (D.1.), POLS 210 (D.1.)

HIST 315 (D.2.)

Economics (D.3.)* see Support Courses

ANT 201/GEOG 150/SOC 105 (D.4.a.)

ANT/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)

Area E: 5

PSY 201/PSY 202 (E.1.)

BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)

Area F: 2

A minimum of 6 units is required; 4 of the units are in Support

Computer literacy (F.1.)* see Support Courses

Technology elective (F.2.)

Total 60

A minimum of 79 units is required; 19 of the units are in Support

ELECTIVES 18

186

Accounting Concentration

ACTG 304 Tax Accounting	4
ACTG 321 Intermediate Accounting I	4
ACTG 322 Intermediate Accounting II	4
ACTG 323 Intermediate Accounting III	4
ACTG 446 Auditing	4
Adviser approved electives	8

28

BUSINESS ADMINISTRATION DEPARTMENT

**Business Bldg. (03), Room 405
(805) 756-2822**

Faculty

Department Head, John C. Rogers

Dan Bertozzi, Jr.	Lynn E. Metcalf
Norm A. Borin	Walter W. Perlick
Lee B. Burgunder	Kenneth D. Riener
Jeffrey E. Danes	Luc A. Soenen
John Dobson	Teresa Swartz
D. Jan Duffy	Harry S. Watkins
R. Krishnan	Alan M. Weatherford
John R. Lindvall	

Programs

B.S. Business Administration

Students may select Adviser Approved Electives or a Concentration in:
Financial Management
Marketing Management

The department offers an undergraduate program leading to the Bachelor of Science degree in Business Administration with concentrations available in Financial Management and Marketing Management.¹

The objective of the Business Administration Department is to prepare graduates for rewarding careers in the fields of marketing and/or finance. Within the concentrations there is sufficient flexibility to allow each student the opportunity to develop proficiency in subject matter uniquely suited for the student's occupational goals.

The department provides service courses to many departments of the university, notably in Business Law and Business, Government and Society. The department also provides major staff support for the Master's degree program in Business Administration. See Master of Business Administration for details of this program.

CURRICULAR CONCENTRATIONS

Financial Management

This concentration provides both depth of exposure in finance as well as breadth of exposure to related fields for students interested in careers in finance. Students are exposed to specialized coursework in corporate finance, investments, real estate, and financial markets. In addition, coursework in computer science, management information systems, accounting, and economics is encouraged to provide broader familiarity with these important "tool" areas

of finance. Successful graduates are much in demand for positions in banking, corporate financial planning, real estate, and many other business areas.

Marketing Management

This concentration emphasizes coursework in all of the many areas traditionally covered in the marketing function. These areas include marketing research, sales management, physical distribution, promotion, buyer behavior, and services marketing. Students must take the majority of their elective courses from Marketing. Graduates of this concentration are in demand for positions in marketing intelligence, research, advertising, and sales management.

Adviser Approved Electives

Students have the option of choosing one of the above mentioned concentrations or 27 units of adviser approved electives. Students select courses according to individual talents and interests.

¹ The Agricultural Business Major is distinguished from a major in Business Administration. Agricultural Business emphasizes training in management for careers in agriculture. The program focuses on preparation of students for careers in firms that supply inputs and services to agricultural production enterprises and by those engaged in the processing, marketing, financing, distribution, and sales of agricultural products. In addition, there is a concentration available in the management of farms and ranches as a business enterprise. Thirty units of coursework in production agriculture are required.

B.S. BUSINESS ADMINISTRATION

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

	Units
ACTG 224 Financial Accounting	5
ACTG 225 Managerial Accounting	4
BUS 207 Business Law	4
BUS 404 Government and Social Influences on Business	4
BUS 461 Senior Project	2
BUS 462 Senior Project	2
FIN 342 Financial Management	4
MGT 301 Production and Operations Management..	4
MGT 317 Organizational Behavior	4
<i>International business</i>	
Select one from: BUS 490, ECON 401, FIN 430, MGT 406, MKTG 401).....	4
MGT 414 Business Strategy and Policy Seminar.....	4
MIS 321 Management Information Systems	4
MKTG 301 Principles of Marketing	4
Concentration courses (see below)	27
	<hr/> 76

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

CSC 120 Principles of Business Data Processing (F.1)*	4
ECON 221 Microeconomics	4
ECON 222 Macroeconomics (D.3.)*	4
ECON elective (300–400 level)	4
MATH 124 Finite Mathematics (B.2.)*	3
MATH 221 Calculus for Business and Economics (B.2.)*	4
STAT 251 Statistical Inference for Mgmt. I (B.2.)*	4
STAT 252 Statistical Inference for Mgmt. II	4
	<hr/> 31

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	7
<i>A minimum of 18 units is required; 11 of the units are in Support</i>	
Physical and life sciences electives (one with lab) (B.1.)	
Mathematics/statistics (B.2.) * see Support Courses	

Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	

Area D:	14
<i>A minimum of 18 units is required; 4 of the units are in Support</i>	
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
Economics (D.3.)* see Support Courses	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	

Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	

Area F:	2
<i>A minimum of 6 units is required; 4 of the units are in Support</i>	
Computer literacy (F.1.)* see Support Courses	
Technology elective (F.2.)	

Total.....	<hr/> 60
<i>A minimum of 79 units is required; 19 of the units are in Support</i>	

ELECTIVES	19
	<hr/> 186

CONCENTRATIONS OR ELECTIVES (select one)**Financial Management Concentration**

ACTG 321 Intermediate Accounting I	4
FIN 411 Security Analysis and Portfolio Management	4
FIN 430 International Business Finance Management	4
FIN 489 Case Studies in Finance	4
Adviser approved electives	11
	<hr/> 27

Marketing Management Concentration

MKTG 302 Marketing Research I	4
MKTG 303 Buyer Behavior.....	4
MKTG 406 Marketing Management.....	4
Electives selected from.....	12
MKTG 305, 401, 402, 404, 405, 412, 450, 470	
Adviser approved electives	3
	<hr/> 27

Adviser Approved Electives	27
Adviser may authorize deviations from specific concentration requirements in order to achieve student career goals.	

ECONOMICS DEPARTMENT

**Business Bldg. (03), Room 407
(805) 756-2783**

Faculty

Department Head, Artemis Papakyriazis

George L. Beardsley, Jr.	Walter E. Rice
Phillip Fanchon	Alden F. Shiers
Timothy W. Kersten	Daniel J. Villegas
Michael L. Marlow	Daniel P. Williamson
Panagiotis Papakyriazis	

Programs

B.S. Economics

Students may select Adviser Approved Electives or a Concentration in:

Business and Industrial Economics
International Trade and Development
Quantitative Economics

Economics Minor

The Economics Department has two broad purposes: it serves all colleges of the campus by offering courses which will help students to understand the overall functioning of the American economy; and secondly, it offers an undergraduate program leading to the Bachelor of Science degree in Economics. The department also offers an Economics Minor.

The Economics Department supports the concept of international education and encourages its students to investigate opportunities for overseas study.

The Economics degree program will prepare students for employment in the private and public sectors of both the domestic and international levels as economists, analysts and general managers. The teaching of economics in high school is another occupational field for the economist. Finally, the program will prepare students to undertake graduate study in economics, law, business administration and related fields in the social sciences.

CURRICULAR CONCENTRATIONS

Economics majors may take any concentration offered by the College of Business or the Political Science or Social Sciences departments in lieu of the economics concentrations described below, provided appropriate prerequisites are satisfied. Students may also choose to select Adviser Approved Electives in place of a concentration.

Business and Industrial Economics

The Business and Industrial Economics concentration, designed for those students who intend to seek business and industrial application of the economics discipline, provides a balanced program of economic and business theory and application.

International Trade and Development

This concentration provides a core of trade and development theory, plus study in ancillary elective fields that meet the occupational needs of students. It is designed for those students interested in working in an international area in the public or private sectors.

Quantitative Economics

This concentration will offer a combination of mathematics, statistics, and quantitative economics courses. As a unit they are designed to provide the graduate with a background adequate for employment in a variety of business and other situations where the economic decision makers rely on the precision of the mathematician's tools, or for entrance to graduate study in such fields as economics, business administration, or operations research.

Adviser Approved Electives

Students have the option of choosing one of the above mentioned concentrations or 24 units of adviser approved electives. Students can study the interrelationships among different disciplines. The world is rapidly changing and the technological and sociological prototypes might not be applicable any longer. Evolution in science and technology is changing the social and economic structure and the student is encouraged to explore these changes. Students select courses according to individual talents and interests.

B.S. ECONOMICS

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements.

	Units
ACTG 224 Financial Accounting	5
ACTG 225 Managerial Accounting	4
ECON 221 Microeconomics	4
ECON 222 Macroeconomics (D.3.) *	4
ECON 311, ECON 312 Intermediate Microeconomics	4,4
ECON 313 Intermediate Macroeconomics	4
ECON 314 Monetary and Fiscal Policies	4
ECON 337 Money, Banking and Credit	4
ECON 338 Stochastic Modeling in Decision Making Systems	4
ECON 417 Development of Economic Analysis	4
ECON 460 Undergraduate Seminar	2
ECON 461 Senior Project	2
ECON 462 Senior Project	2
MATH 221 Calculus for Business and Economics (B.2.)*	4
MATH 222 Math Analysis for Economics and Business (B.2.) *	4
Restricted electives to be selected from: ECON 105, 304, 306, 323, 324, 325, 339, 401, 402, 403, 410, 413, 431, 432, 433, 434	12
Concentration courses or adviser approved electives	24
	<hr/> 95

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

BUS 207 Business Law	4
CSC 120 Principles of Business Data Processing (F.1)*	4
MATH 124 Finite Mathematics	3
STAT 251 Statistical Inference for Management I (B.2.)*	4
STAT 252 Statistical Inference for Management II	4
	<hr/> 19

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level. Additional GEB courses are listed under Major and Support courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	

Area B:	6
A minimum of 18 units is required; 12 of the units are in Support	
Physical and life sciences electives (one with lab)	
Mathematics/statistics * see Major and Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	14
A minimum of 18 units is required; 4 of the units are in Major	
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
Economics (D.3.) *see Major Courses	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	2
A minimum of 6 units is required; 4 of the units are in Support	
Computer literacy (F.1.) *see Support Courses	
Technology elective (F.2.)	
Total	<hr/> 59
A minimum of 79 units is required; 20 of the units are in Support	

ELECTIVES	13
	<hr/> 186

CONCENTRATIONS OR ADVISER APPROVED ELECTIVES (select one)**Business and Industrial Economics Concentration**

ECON 306 Applied Forecasting	4
ECON 403 Industrial Organization	4
ECON 413 Labor Economics	4
MGT 312 Organization and Management Theory or MIS 318 Modeling Systems	4
Adviser approved electives	8
	<hr/> 24

International Trade and Development Concentration

ECON 325 Underdevelopment and Economic Growth.	4
ECON 401 International Trade.....	4
ECON 402 International Monetary Economics	4
Foreign language.....	4
Adviser approved electives.....	8
To be selected from upper division courses in ECON, FIN, MGT, MKTG, or any other discipline with approval of adviser.	
	<hr/> 24

Quantitative Economics Concentration

ECON 306 Applied Forecasting	4
ECON 339 Econometrics	4
MIS 318 Modeling Systems	4
Adviser approved electives.....	12
	<hr/> 24

Adviser Approved Electives

Students select courses with adviser approval	24
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CURRICULUM FOR ECONOMICS MINOR

This minor is designed to give students from other majors a general competency in economics. Its principle intent is to help meet the growing demand for secondary school teachers of economics. Students completing the minor will satisfy the state requirements for a supplementary authorization to teach economics in California high schools. For more information, contact the Economics Department.

	<hr/> <i>Units</i>
Required courses	17
ECON 105 Personal and Consumer Economics (4)	
ECON 211 Principles of Economics (D.3.) (3)	
ECON 212 Macroeconomics (3)	
ECON 304 Comparative Economic Systems (D.4.b.) (3)	
ECON 337 Money, Banking and Credit (4)	
Approved electives (choose any two courses)	7-8
ECON 323 Economic History of the Advanced World (4)	
ECON 324 American Economic History (4)	
ECON 325 Underdevelopment and Economic Growth (D.4.b.) (3)	
ECON 431 Environmental Economics (4)	
ECON 432 Economics of Energy and Resources (4)	
ECON 401 International Trade (4)	
ECON 413 Labor Economics (4)	
	<hr/> 24-25

See COURSES OF INSTRUCTIONS section of this catalog for descriptions of courses in Economics and other subjects.

INDUSTRIAL TECHNOLOGY DEPARTMENT

**Business Bldg. (03), Room 413
(805) 756-2676**

Faculty

Department Head, Fred P. Abitia

Gerald E. Cunico	James L. Murphy
Larry W. Gay	Anthony J. Randazzo
Roger L. Keep	Nelson L. Smith III
Lynn S. Mosher	

Programs

B.S. Industrial Technology

M.A. Industrial and Technical Studies

Integrative Technology Minor

Packaging Minor

The Industrial Technology Department offers the Bachelor of Science in Industrial Technology and the Master of Arts in Industrial and Technical Studies. This department also administers the Bachelor of Vocational Education program and the Packaging Minor.

The Bachelor of Science program in Industrial Technology prepares graduates for employment in a broad range of professional positions in Industrial Management. Industrial Technology graduates are generalists prepared to help employers make better decisions about investing in or managing technologies that can add value to materials, processes, products and services.

This major emphasizes preparation for industrial technical leadership responsibilities with a broad variety of industries including manufacturing, communication, transportation and utility services. Graduates in the field of industrial management function in the mid-ground between the applied aspects of engineering and administration. Students who enjoy working primarily with people in solving technical problems are particularly well suited for careers in industrial technology. Preparation for professional emphasis in industrial sales, production, quality management, plant facilities and construction management, industrial training, or packaging is provided through the selection of appropriate electives.

INTEGRATIVE TECHNOLOGY MINOR

This minor is an interdisciplinary program which is sponsored by three departments: Industrial and Manufacturing Engineering, Industrial Technology, and Psychology and Human Development. Students learn about the technical, social and business issues related to the use of new technology and how the technology is integrated into corporate operations. The minor appeals to students who are majoring in nontechnical disciplines.

For more information, please consult with Dr. Dan Levi, Psychology and Human Development Department.

	<i>Units</i>
Required courses	17
IME 157 Electronic Manufacturing (3)	
IME 234 Robotics Assembly (2)	
IME 214 Production Control (2)	
IME 319 Human Factors Engineering (3)	
IT 303 Industrial Quality Control Management (4)	
PSY 494 Psychology of Technological Change (3)	
Management electives (select one)	3-4
MGT 311 Industrial Management (4)	
MGT 313 Industrial Relations (3)	
MGT 314 Human Resources Management (4)	
Humanities electives (select one)	3
HIST 306 History of American Technology (3)	
HIST 384 Labor and Work in American History (3)	
HUM 402 Values and Technology (3)	
Social and Behavioral Sciences electives (select one)	3-4
BUS 404 Government and Social Influence on Business (4)	
PSY 302 Behavior in Organizations (3)	
SPC 213 Organizational Communication (4)	

PACKAGING MINOR

The purpose of this interdisciplinary minor is to complement the student's degree major with a planned curriculum in packaging. The program is designed to capitalize on theories and skills learned in other disciplines thereby uniquely preparing students for success as packaging professionals in positions ranging from highly technical research and development through purchasing, production, sales and management.

Students gain the skills needed for the design of package forms and graphics, the specifications of materials and machinery to be used, the evaluation of package systems, as well as the planning and coordinating of packaging requirements. These specialized skills result from an integration of knowledge gained through the packaging curriculum with that of the major discipline. A significant understanding of packaging issues and their impact on the industry is also gained.

	Units
Required core	19
CHEM 121 General Chemistry (B.1.a.) (4)	
FSN 336 Food Packaging (3)	
IT 327 Plastics Technology (4)	
IT 330 Fundamentals of Packaging (4)	
PHYS 104 Introductory Physics (B.1.a.) (4) or	
PHYS 121 College Physics (B.1.a.) (4)	
Adviser approved electives	9-11
Select three courses from the following list. Two courses must be 300–400 level to be selected with adviser's approval.	
FSN 217 Fundamentals of Food Processing Operations (4)	
FSN 230 Elements of Food Processing (4)	
FSN 332 Statistical Quality Control (3)	
GRC 437 Consumer Packaging (3)	
IT 334 Materials Handling and Packaging (3)	
IT 408 Protective Packaging (3)	
IT 409 Machinery for Packaging (3)	
IT 435 Package Development Management (3)	

 28-30
B.S. INDUSTRIAL TECHNOLOGY

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

Units

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements.

IT 126 Industrial Materials and Processes	4
IT 137, IT 138 Introduction to Industrial Electricity	4,4
IT 150 Mechanical Energy	4
IT 212 Introduction to Industrial and Technical Management.....	4
IT 232 Introduction to C.A.D. and Other Computer Applications	4
IT 303 Industrial Quality Control Management	4
IT 313 Industrial Cost Control	4
IT 320 Applied Metal and Ceramics Processes	4
IT 327 Plastics Technology	4
IT 330 Fundamentals of Packaging	4
IT 332 Industrial Electrical and Electronic Systems ...	4
IT 345 Applied Production Management	4
IT 402 Technical and Management Presentations	4
IT 406 Industrial Management and Supervision	4
IT 410 Industrial Planning.....	4
IT 411 Industrial Safety and Health Management	4
IT 432 Energy Management	4
IT 461 Senior Project	3
MGT 301 Production and Operations Management ..	4
Adviser approved electives	13

 92
SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

¹ MATH 120 Pre-Calculus Algebra and Trigonometry (B.2.)*	5
MATH 131 Technical Calculus	4
PHYS 121 College Physics (B.1.a.)*	4
PHYS 122 College Physics	4
CHEM 121 General Chemistry (B.1.a.)*	4
ECON 201 Survey of Economics (D.3.)*	3
STAT 211 Elementary Probability and Statistics (B.2.)*	3

 27

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.

Additional GEB courses are listed under Major and Support courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	3
A minimum of 18 units is required; 15 of the units are in Support	
Physical science (B.1.a.)* see Support Courses	
Life sciences elective (B.1.b)	
Mathematics/statistics * see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	15
A minimum of 18 units is required; 3 of the units are in Support	
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
Economics (D.3.) *see Support Courses	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	3
Computer literacy (F.1.)	
Total	58
A minimum of 76 units is required; 18 of the units are in Support	
Electives	9
	<hr/> 186

¹ MATH 116 and MATH 117 or MATH 118 and MATH 119 may be used in lieu of MATH 120.

MASTER OF ARTS DEGREE IN INDUSTRIAL AND TECHNICAL STUDIES

The Master of Arts program in Industrial and Technical Studies is designed to provide preparation for professional responsibilities and leadership for a broad range of professional positions in technical businesses and industry.

The curriculum translates a contemporary body of context derived from the business-industrial-technological segment of society into awareness, understandings, experiences and competencies.

Prerequisites

Admission as a graduate student in this program requires a 2.8 minimum grade point average in the last 90 quarter units of coursework attempted or equivalent. Advancement to candidacy requires completion of 12 units of courses specified in a formal program of study with a minimum grade point average of 3.0.

Non-technical baccalaureate degree students will be required to enroll in 15 quarter units of approved technical courses or provide documentation of appropriate experiences. Courses must be successfully completed prior to submittal of a Formal Study Plan. Refer to the Graduate Studies section of the catalog for additional requirements.

Admission Status

If the student meets the general requirements for graduate studies, the student will be considered for admission in one of two categories:

Graduate classified - the student fully meets all department and university requirements.

Graduate conditionally classified - the student may be admitted to the degree program if in the opinion of appropriate university authority, the student can remedy deficiencies by completing additional requirements.

For information pertaining to specific requirements for admission, graduate classified or graduate conditionally classified, the student should communicate with the department's Graduate Coordinator.

Program of Study

The Master of Arts degree in Industrial and Technical Studies is an integrated program of 45 units of graduate courses commencing in any quarter of each year, and is designed for students who have a baccalaureate degree in Industrial Technology, or who have comparable technical and professional preparation. Master's level courses at the 400-500 level are offered, when possible, in the summer and in the late afternoon and evening to accommodate those individuals who are employed full-time. Students who choose the option of the comprehensive examination must take the examination within one year of completing the last

Industrial Technology graduate course on the Formal Study Plan. Failure to do so will necessitate that the student complete a thesis or project to fulfill the requirement of the degree.

A minimum grade point average of 3.0 must be maintained in all courses taken to satisfy the requirements for the degree. All candidates must meet the current Graduation Writing Requirement.

400-level courses used as part of a graduate program will include an extra written or oral assignment.

A student shall complete all requirements for the degree within a seven-year period.

CURRICULUM FOR M.A. INDUSTRIAL AND TECHNICAL STUDIES

	<i>Units</i>
Required Courses	26
IT 505 Graduate Seminar (3)	
IT 515 Historical and Philosophical Perspective of American Industry (3)	
IT 520 Organization and Administration of Industrial and Technical Environments (3)	
IT 521 Training in Industrial and Technical Systems (3)	
IT 522 Facility Planning (3)	
IT 527 Technical Trends and Issues (3)	
IT 580 Graduate Research in Industrial and Technical Systems (3)	
¹ IT 599 Industrial and Technical Studies Thesis or Project (5)	
Professional technical electives	19
Elective courses at the 400-500 level chosen with approval of the Graduate Coordinator	
	<hr/> 45

See COURSES OF INSTRUCTION section of the catalog for description of courses in Industrial Technology and other subjects.

¹ The student may be permitted a nonthesis/project option by accomplishing all of the following steps: 1) Obtaining approval of the department Graduate Coordinator. 2) Substituting 5 units of 500-level coursework which support the degree and are approved in advance by the department Graduate Coordinator. IT 500 Individual Study (1-6) is recommended. 3) Passing a comprehensive written examination covering the graduate program.

MANAGEMENT DEPARTMENT

**Business Bldg. (03), Room 409
(805) 756-1301**

Faculty

Department Head, A. B. (Rami) Shani

Joseph Biggs	Eldon Y. Li
Rebecca Ellis	David A. Peach
Barry Floyd	Rolf E. Rogers
Colette Frayne	James Sena
J. Michael Geringer	Michael Stebbins
Ray M. Haynes	

Programs

B.S. Business Administration

Students may select Adviser Approved Electives or a Concentration in:

Human Resources Management
International Business Management
Management
Management Information Systems
Production and Operations Management

The objectives of the Management Department are to provide knowledge and skills of modern management theory and practice through the study of subjects critical to management performance (including general management, human resources management, international management, management information systems, and production and operations management); to develop in the student knowledge and skills of a second area or function to facilitate initial employment and subsequent career development; to help the student to acquire an appreciation of cultural, economic, political and technological trends which affect the role of managers in contemporary society; to help professionally oriented students use theories, concepts, research findings, problem-solving techniques, and analytical skills in management situations; and to provide a broad background and generalist viewpoint by encouraging study of individual courses in several knowledge and skill areas (including labor, economics, and social and political science).

The degree awarded is the Bachelor of Science in Business Administration with a concentration in Human Resources Management, International Business Management, Management, Management Information Systems, or Production and Operations Management.

CURRICULAR CONCENTRATIONS

Human Resources Management

The two areas of interest within this concentration relate to labor management relations and personnel management. Students learn how to perform the functions of recruitment, selection, development, compensation, contract negotiations, and administration.

International Business Management

This concentration is designed to provide the student the opportunity to develop proficiency in the subject matter basic to an occupational goal in the management of international/multinational operations. It provides cultural understanding, organizational knowledge and analytical skill central to international business management.

Management

This concentration stresses the managerial process and decision making fundamental to all levels and functional areas of the business and industrial enterprise. The management program offers both quantitative and general management emphases to satisfy the individual needs of the student relative to business or academic ambitions.

Management Information Systems

This concentration is designed to prepare students for careers involving the analysis, design, and operation of business information systems within industry and government. It provides training and practice in administrative data processing and in the analysis of managerial information requirements.

Production and Operations Management

This concentration prepares students for careers in production and operations management with business or service organizations. It provides training in purchasing; cost, quality, and inventory control; materials planning; and other production or operations management functions.

Adviser Approved Electives

Students have the option of choosing one of the above mentioned concentrations or 31 units of adviser approved electives. Students select courses according to individual talents and interests.

B.S. BUSINESS ADMINISTRATION

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

	Units
ACTG 224 Financial Accounting	5
ACTG 225 Managerial Accounting	4
BUS 207 Business Law	4
BUS 404 Government and Social Influences on Business	4
FIN 342 Financial Management	4
MGT 301 Production and Operations Management ..	4
MGT 317 Organizational Behavior	4
<i>International business</i>	
Select one from: BUS 490, ECON 401, FIN 430, MGT 406, MKTG 401	4
MGT 414 Business Strategy and Policy Seminar	4
MGT 461 Senior Project	2
MGT 462 Senior Project	2
MIS 321 Management Information Systems	4
MKTG 301 Principles of Marketing	4
Concentration courses or adviser approved electives	27-34
	<hr/> 76-83

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

CSC 120 Principles of Business Data Processing (F.1.)*	4
ECON 221 Microeconomics	4
ECON 222 Macroeconomics (D.3.)*	4
ECON elective (300–400 level)	4
MATH 124 Finite Mathematics (B.2.)*	3
MATH 221 Calculus for Business and Economics (B.2.)*	4
STAT 251 Statistical Inference for Mgmt. I (B.2.)*	4
STAT 252 Statistical Inference for Mgmt. II	4
	<hr/> 31

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	

Area B:	7
A minimum of 18 units is required; 11 of the units are in Support	
Physical and life sciences (one with lab) (B.1.)	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	14
A minimum of 18 units is required; 4 of the units are in Support	
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
Economics (D.3.)* see Support Courses	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	2
A minimum of 6 units is required; 4 of the units are in Support	
Computer literacy (F.1.)* see Support Courses	
Technology elective (F.2.)	
Total	<hr/> 60
A minimum of 79 units is required; 19 of the units are in Support	

ELECTIVES	12-19
	<hr/> 186

CONCENTRATIONS OR ADVISER APPROVED ELECTIVES (select one)**Human Resources Management Concentration**

MGT 310 History of Management, Labor and Capitalism in the U.S.	4
MGT 314 Human Resources Management	4
MGT 410 Compensation	4
MGT 415 Advanced Personnel Management	4
Adviser approved electives	16
	<hr/> 32

International Business Management Concentration

ECON 401 International Trade	4
ECON 402 International Monetary Economics or FIN 430 International Business Finance	4
MGT 332 International Cross Cultural Mgmt.....	4
MGT 314 Human Resources Management.....	4
MGT 489 Adv. Seminar in International Mgmt.....	4
MKTG 401 International Marketing	4
Adviser approved electives.....	7
	<hr/> 31

Management Concentration

MGT 314 Human Resources Management.....	4
MGT 331 Organization Design and Analysis	4
MGT 332 International Cross Cultural Management..	4
MGT 488 Small Business Management.....	4
Adviser approved electives.....	15
	<hr/> 31

Management Information Systems Concentration

CSC 118 Fundamentals of Computer Science I	4
CSC 218 Fundamentals of Computer Science II.....	3
CSC 203 COBOL Programming.....	3
CSC 345 Data Structures.....	3
MGT 314 Human Resources Management.....	4
MIS 412 Information Management and Database Systems	4
MIS 422 Information Systems Analysis & Design	4
MIS 432 Information Systems Design and Implementation.....	4
Adviser approved electives.....	5
	<hr/> 34

Production and Operations Management Concentration

ACTG 402 Advanced Cost Accounting.....	4
MGT 314 Human Resources Management.....	4
MGT 440 Service Operations Management.....	4
MGT 441 Operations Planning and Control	4
MGT 442 Purchasing and Materials Management.....	4
MGT 445 Advanced Operations Management	4
MGT 487 Seminar in Quality Management	4
Adviser approved electives.....	6
	<hr/> 34

Adviser approved electives 31



SCANNING ELECTRON MICROSCOPE

Materials Engineering students Carl Nail and Lisa DiDonna use this equipment which has the capability of 20,000x magnification of surfaces. *Photo by Doug Allen.*



X-RAY DIFFRACTOMETER

Materials Engineering student Dale Claussen uses this equipment to study the crystal structure of metals, ceramics, polymers, and naturally-occurring minerals. *Photo by Doug Allen.*



ADVANCED ENGINEERING WORKSTATIONS

The Mechanical Engineering Department's HP Advanced Engineering Workstations are available for student design projects. The stylus on the menu pad allows students to enter CAD commands to produce engineering drawings and analyses. *Photo by Doug Allen.*

College

of

ENGINEERING

College of Engineering

**Engineering Bldg. (13), Room 266
(805) 756-2131**

**Peter Y. Lee, Dean
Paul E. Rainey, Associate Dean
Daniel W. Walsh, Associate Dean**

Department/Location:	Program:
Engineering	Engineering: MS
Engineering/Business	Engineering Management, MBA/MS
Engineering/Architecture & Environmental Design	Transportation Planning, MCRP/MS
College of Agriculture	Agricultural Engineering: BS*
Aeronautical Engineering	Aeronautical Engineering: BS,* MS
Civil and Environmental Engineering	Civil Engineering: BS* Environmental Engineering: BS* Civil and Environmental Engineering: MS
Computer Engineering	Computer Engineering: BS
Computer Science	Computer Science: BS, MS, Minor
Electronic and Electrical Engineering	Electrical Engineering: BS*, MS
Engineering Science	Engineering Science: BS
Industrial and Manufac- turing Engineering	Industrial Engineering: BS* Manufacturing Engineering: BS Integrative Technology: Minor
Materials Engineering	Materials Engineering: BS*
Mechanical Engineering	Mechanical Engineering: BS*

* Engineering programs accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Engineering and computer science at Cal Poly are strongly oriented toward preparing students for immediate entry into professional practice upon graduation from one of the bachelor's degree programs. Each student selects a major at entrance and generally takes at least one course in that major each quarter. This early introduction increases motivation to master the mathematics, basic science, and engineering science or computer science which constitute a very important portion of each curriculum.

The undergraduate engineering disciplines listed above provide the education for entry to the engineering profession and for continued academic work toward advanced degrees. Many of our graduates enter graduate programs at Cal Poly or

other institutions. Cal Poly engineering and computer science graduates are in great demand and find a large variety of challenges awaiting them. They enter professional occupations such as engineering design, computer hardware and software engineering, test and evaluation, systems analysis, modeling and simulation, manufacturing, applied research, development, sales, and field engineering. Graduates pursue careers in a broad cross-section of industry, government agencies, public utilities, marketing groups, and educational institutions.

The Accreditation Board for Engineering and Technology (ABET) defines engineering as "the profession in which a knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize economically the materials and forces of nature for the benefit of mankind."

The Bachelor of Science degree in Computer Science is designed in accordance with the model computer science curricula of the Computing Sciences Accreditation Board (CSAB). Numerous laboratory and project experiences enhance the practical skills of the graduate. They are equally prepared for the practice of computer science and graduate study.

The master's degree programs in the College of Engineering are built upon the excellence of Cal Poly's undergraduate engineering and computer science programs. Industry most often considers the master's degree as an important requirement for the design, development, applied research and analysis occupations in engineering and computer science. The master's degree allows entry into these occupations at higher levels of technical skills and responsibilities.

The M.S. in Computer Science has special provisions for students whose undergraduate degree is in a field other than computer science. Students from a wide variety of fields have earned the M.S. in Computer Science by following a carefully designed remedial curriculum prior to enrolling in graduate courses. A similar program is available in the engineering master's degree program for students whose undergraduate degree is in a closely related field of science.

ADVISING CENTER

Stacey Breitenbach, Director
Computer Science (14), Room 240
(805) 756-1461

The College of Engineering Advising Center provides academic advising services to all majors within the College

of Engineering in conjunction with each student's faculty adviser. The Advising Center is open five days a week, nine hours per day during the quarter.

Faculty Advisers are responsible for providing technical advice. Student course scheduling, course content questions, and career planning are usually done by the faculty advisers. Students seeking information about graduate schools, coop's, and future jobs should contact their faculty adviser. Faculty advisers are assigned by the student's department office upon acceptance into engineering.

The advising services provided by the Advising Center vary by major due to special requests by various department chairs, but the following is true for most majors:

The *Advising Center* is responsible for providing procedural advice. Academic and administrative progress of all engineering students is done within the Advising Center. Current academic and administrative probation policies are posted in the Advising Center's glass case. (New students should be aware that all engineering students are required to enroll and complete a minimum of two major and/or support courses per quarter with no more than one course per quarter that does not count toward their stated degree.) Most student-related forms (such as curriculum substitution forms, withdrawal forms, and change of major forms) are processed in the Advising Center. Depending on the form and the student's major, the director of the Advising Center has signature authority to sign for the adviser, department chair, and associate dean. Student course scheduling is done in the Advising Center for some engineering majors when time permits. The majority of the general education and breadth questions and interpretation of transfer credit are done in the Advising Center after the Evaluations Office has provided the initial evaluation.

The Advising Center maintains working folders on each student. These folders, in conjunction with SIS+ (which is the student computer accessed database used at Cal Poly), are used for general advising purposes that include: checking progress toward the student's major, monitoring the student's major grade point average, verifying satisfaction of the Graduation Writing Requirement, and pre-graduation completion checks. The Advising Center has past and present flowcharts and curriculum sheets for all engineering majors, major specific technical elective forms, EIT information packets, articulation agreements, and engineering-related pamphlets for student perusal. The Advising Center is able to answer most university, college, or department questions or refer the student to the correct office.

Transfer Students

Attention is directed to the following chart on recommended community college preparation for engineering and computer science major curricula. This chart should be studied and followed in order to prevent loss of time in completing the program after transferring to Cal Poly.

Recommended Community College Preparation for Engineering and Computer Science Curricula

<i>Recommended C.C. Preparation in Terms of Cal Poly Courses</i>	<i>Qtr. Units</i>	<i>Aero</i>	<i>AE</i>	<i>CE</i>	<i>CPE</i>	<i>CSC</i>	<i>EE</i>	<i>ESc</i>	<i>EnvE</i>	<i>IE</i>	<i>MfgE</i>	<i>MatE</i>	<i>ME</i>
Maximum Transfer Units		105	105	105	105	105	105	105	105	105	105	105	105
Mathematics													
MATH 141 Calculus I	4	X	X	X	X	X	X	X	X	X	X	X	X
MATH 142 Calculus II	4	X	X	X	X	X	X	X	X	X	X	X	X
MATH 143 Calculus III	4	X	X	X	X	X	X	X	X	X	X	X	X
MATH 206 Linear Algebra I	4					X							
MATH 241 Calculus IV	4	X	X	X	X		X	X	X	X	X	X	X
MATH 242 Differ. Equations	4	X	X	X	X		X	X	X	X	X	X	X
Physics													
PHYS 131 General Physics	4	X	X	X	X	X	X	X	X	X	X	X	X
PHYS 132 General Physics	4	X	X	X	X	X	X	X	X	X	X	X	X
PHYS 133 General Physics	4	X	X	X	X	X	X	X	X	X	X	X	X
PHYS 211 Modern Physics	4	X			X		X						
Chemistry													
CHEM 124 General Chemistry	4	X	X	X	X	X	X	X	X	X	X	X	X
CHEM 125 General Chemistry	4		X	X			X	X	X	X	X	X	X
CHEM 129 General Chemistry	4								X				
Engineering, Computer Science & Supporting Courses													
Engineering Drafting	–	2	2	0	0	0	0	2	0	2	2	1	2
Digital Computer Science	–	2	2	2	10	10	3	3	2	3	3	2	2
Manufacturing Processes	–	2	4	0	0	0	0	4	0	4	5	4	5
Strength of Materials	–	6	6	6	0	0	0	6	5	3	6	6	6
Engineering Statics & Dynamics	–	6	6	6	3	0	6	6	6	6	6	6	6
Circuits and Electronics (engineering calculus based)		4	4	4	8	0	8	4	4	4	4	4	4
Descriptive Geometry	–	2	2	2	0	0	0	0	2	0	2	0	2
Materials Engineering	–	3	0	4	0	0	3	4	0	3	4	4	4
Surveying	–	0	2	4	0	0	0	0	0	0	0	0	0
General Education–Breadth													
Courses vary. See appropriate curriculum.													

Cal Poly Majors:

Aero = Aeronautical Engineering
 AE = Agricultural Engineering
 CE = Civil Engineering
 CPE = Computer Engineering

CSC = Computer Science
 EE = Electrical Engineering
 ESc = Engineering Science
 EnvE = Environmental Engineering

IE = Industrial Engineering
 MfgE = Manufacturing Engineering
 MatE = Materials Engineering
 ME = Mechanical Engineering

Master of Science in Engineering

M.S. Engineering with Specializations in:

Biochemical Engineering
Industrial Engineering
Materials Engineering
Mechanical Engineering
Water Engineering

Joint Programs:

M.B.A./M.S. Engineering with a Specialization in Engineering Management
M.C.R.P./M.S. Engineering with a Specialization in Transportation Planning

M.S. in Engineering

General Characteristics

The Master of Science degree program in Engineering has the following objectives:

- Job-entry education for the more complex areas of engineering, such as research and development, innovative design, systems analysis and design, and engineering management;
- Updating and upgrading opportunities for practicing engineers;
- Graduate preparation for further study in engineering, leading to the Doctor of Engineering or Ph.D. degree;
- Allows graduates to maintain currency in their fields.

Prerequisites

For admission as a classified graduate student, an applicant should hold a bachelor's degree in engineering or a closely related physical science with a minimum grade point average of 2.5 in the last 90 quarter units (60 semester units) attempted. Applicants for graduate engineering programs are required to submit scores for the General Test of the Graduate Record Examination. An applicant who meets these standards but lacks prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies before advancement to classified graduate standing.

Additional information may be obtained from the individual departments in the College of Engineering.

Program of Study

Graduate students must file a formal study plan with their adviser, department, college and university graduate studies office by no later than the end of the quarter in which the 12th unit of approved courses is completed.

The formal program of study must include a minimum of 45 units (at least 23 of which must be at the 500 level) with a specialization in one of the following areas: Biochemical Engineering, Industrial Engineering, Materials Engineering, Mechanical Engineering, Water Engineering.

The broad curriculum requirements for the Master of Science degree in Engineering are:

- a) a minimum of 24 units in the field of specialization, with at least 18 units at the 500 level;

- b) a minimum of 9 units from an approved list of mathematics, statistics, computer science, or analytic engineering courses, with at least 3 units at the 500 level;
- c) the remaining units taken from a list of approved electives;
- d) at least 23 units of the 45 unit program at the 500 level.

In some specializations, two program options are available for M.S. in Engineering students: a thesis program which requires coursework, a thesis and oral defense of thesis; or a nonthesis option which involves additional coursework and a comprehensive examination. The nonthesis option is normally allowed only for those students who have completed an undergraduate senior project or have had significant engineering project experience.

Other Graduate Engineering Programs

In addition to the M.S. degree in Engineering, the college also offers several other graduate programs: M.S. Aeronautical Engineering, M.S. Civil and Environmental Engineering, M.S. Computer Science, and M.S. Electrical Engineering. Information regarding these programs is listed with the respective department.

Joint Programs

The College of Engineering offers two joint programs: in conjunction with the College of Business, the M.B.A./M.S. Engineering with a specialization in Engineering Management; and with the College of Architecture and Environmental Design (City and Regional Planning Department), the M.C.R.P./M.S. Engineering with a specialization in Transportation Planning. See below for information regarding these joint programs.

**M.S. ENGINEERING WITH SPECIALIZATION IN
BIOCHEMICAL ENGINEERING**

	<i>Units</i>
Core Courses	9
Analytical methods for engineering (6)	
Advanced mathematics (3)	
Required Courses in Specialization	28
ENGR 599 Design Project (Thesis) (2) (2) (5) or	
9 units of approved technical electives <i>and</i> written	
comprehensive examination	
<i>Select 19 units from the following:</i>	
ME 541 Advanced Thermodynamics (4)	
ME 552 Conductive Heat Transfer (3)	
ME 553 Convective Heat Transfer (3)	
ENVE 421 Mass Transfer Operations (3)	
ENGR 581 Biochemical Engineering I (4)	
ENGR 582 Biochemical Engineering II (4)	
ENGR 583 Biochemical Engineering III (4)	
Approved Electives	8
	<u>45</u>

**M.S. ENGINEERING WITH SPECIALIZATION IN
INDUSTRIAL ENGINEERING**

	<i>Units</i>
Core Courses	12
Analytical methods for engineering	
Required Courses in Specialization	24
IME 599 Design Project (Thesis) (2) (2) (5) or	
9 units of approved technical electives <i>and</i> written	
comprehensive examination	
<i>Select 15 units from the following:</i>	
IME 426 Engineering Test Design and Analysis (4)	
IME 544 Advanced Topics in Engineering	
Economy (3)	
IME 541 Advanced Operations Research (3)	
IME 542 Reliability Engineering (3)	
IME 543 Advanced Human Factors (4)	
IME 545 Advanced Topics in Simulation (3)	
IME 555 Computer Integrated Manufacturing (4)	
Approved electives	9
	<u>45</u>

**M.S. ENGINEERING WITH SPECIALIZATION IN
MATERIALS ENGINEERING**

	<i>Units</i>
Core Courses	9
Analytical methods for engineering (6)	
Advanced mathematics (3)	
Required Courses in Specialization	24
MATE 599 Design Project (Thesis) (2) (2) (5) or	
9 units of approved technical electives <i>and</i> written	
comprehensive examination	
<i>Select 15 units from the following:</i>	
MATE 421 Materials Thermodynamics I (4)	
MATE 424 Ceramic Materials (3)	
MATE 562 Mechanical Behavior of Materials (4)	
MATE 564 Fracture Mechanics (3)	
PHYS 412 Solid State Physics (3)	
Approved Electives	12
	<u>45</u>

**M.S. ENGINEERING WITH SPECIALIZATION IN
MECHANICAL ENGINEERING**

	<i>Units</i>
Core Courses	9
Analytical methods for engineering/advanced	
mathematics	
Required Courses in Specialization	27
ME 599 Design Project (Thesis) (2) (2) (5) or	
9 units of approved technical electives <i>and</i> written	
comprehensive examination	
<i>Select 18 units from the following:</i>	
ME 502 Stress Analysis (4)	
ME 517 Advanced Vibrations (4)	
ME 541 Advanced Thermodynamics (4)	
ME 542 Dynamics and Thermodynamics of	
Compressible Flow (4)	
ME 551 Mechanical Systems Analysis (4)	
ME 552 Conductive Heat Transfer (3)	
ME 553 Convective Heat Transfer (3)	
ME 554 Computational Heat Transfer (3)	
Approved electives	9
	<u>45</u>

M.S. ENGINEERING WITH SPECIALIZATION IN WATER ENGINEERING

	<i>Units</i>
Core Courses	9
To be selected with approval of the graduate committee	
Analytical methods for engineering (6)	
Advanced Mathematics	
Required Courses in Specialization	26-27
ECON 410 Public Finance and Cost-Benefit Analysis (4)	
AE 435/AE 414/AE 440	
AE 533 Irrigation Project Design (4)	
CE 533 Advanced Water Resources Engineering (3)	
CE 573 Public Works Administration (3)	
AE 599/CE 599 (Thesis - 9 units) or 9 units of coursework approved by committee, and written oral comprehensive exams.	
Approved Elective Courses	9-10
To be selected from the following list with committee's approval:	
AE 414 Irrigation Systems (4)	
AE 437 Conservation Engineering (3)	
AE 440 Agricultural Irrigation Systems (4)	
AE 492 Pumps and Pump Drivers (3)	
AE 531 Water Wells (3)	
CE 434 Groundwater Hydraulics and Hydrology (3)	
CE 440 Hydraulic Systems Engineering (3)	
CM 533 Case Histories in Construction Management (3)	
ENVE 438 Water and Wastewater Treatment Design (3)	
ENVE 439 Solid Waste Management (3)	
ENVE 535 Advanced Wastewater Treatment	

JOINT M.B.A./M.S. ENGINEERING WITH SPECIALIZATION IN ENGINEERING MANAGEMENT

The joint Engineering Management specialization is an interdisciplinary program linking the MBA and MS in Engineering degree programs. It is a cooperative effort between the College of Engineering (Industrial and Manufacturing Engineering Department) and the College of Business. Students are required to have a prerequisite degree in engineering, computer science, or similar technical degree to be admitted to both the College of Engineering and the College of Business, and to be enrolled in both degree programs. Successful participants will be awarded both MBA and MS in Engineering degrees each with a specialization in Engineering Management.

The three major objectives are:

- 1) to integrate knowledge and skills from engineering and business disciplines for effective responses to rapidly changing technological and business environments;
- 2) to prepare engineers for effective participation in management of technology, management of technology-based organizations, and management of technological change; and
- 3) to take advantage of the unique background of program participants and the unique strengths of Cal Poly.

Units

FIRST YEAR

Students are encouraged to challenge any of the following first-year GSB courses based on previous work.

Fall	15-16
GSB 511 Financial Accounting (4)	
GSB 513 Organization Behavior (4)	
GSB 514 Business Government and Society (4)	
¹ Technical Elective (3-4)	
Winter	16
GSB 521 Managerial Accounting (4)	
GSB 522 Management Science (4)	
GSB 523 Managerial Economics (4)	
IME 557 Technological Assessment and Planning (4)	
Spring	16
GSB 531 Managerial Finance (4)	
GSB 532 Information Systems (4)	
GSB 533 Aggregate Economics (4)	
GSB 534 Production and Operations Management (4)	
Summer	8
GSB 598 Graduate Internship in Business (8)	

SECOND YEAR

Students must select from GSB 578, GSB 587, BUS 490, ECON 401, or MKTG 401 to satisfy one of the following four-unit GSB electives.

Fall	13-15
IME 545 Advanced Topics in Simulation (3)	
¹ GSB elective or technical elective (3-4)	
¹ GSB elective (4)	
¹ Technical elective (3-4)	
Winter	16
GSB 524 Marketing Management (4)	
IME 555 Computer Integrated Manufacturing (4)	
IME 558 Engineering Decision Making (4)	
¹ GSB elective (4)	
Spring	15-16
GSB 562 Business Strategy and Policy (4)	
IME 556 Technological Project Management (4)	
¹ GSB elective (4)	
¹ Technical Elective (3-4)	
Summer	8
¹ GSB electives (4) (4)	
Minimum total units required	<u>107</u>

¹ Technical electives to be selected with College of Engineering adviser's approval. GSB electives to be selected with College of Business adviser's approval.

JOINT MCRP/MS ENGINEERING WITH SPECIALIZATION IN TRANSPORTATION PLANNING

The Transportation Planning Specialization is a joint interdisciplinary program between the College of Engineering and the College of Architecture and Environmental Design. Participation in the program requires enrollment in both Colleges. Participants successfully completing the program will be awarded both the M.C.R.P. and the M.S. in Engineering, each with a Specialization in Transportation Planning.

The major objectives of this joint program are:

- To provide an interdisciplinary graduate program which combines elements of transportation planning with city and regional planning to address a need for professionals who have a command of both the technology of transportation planning and the place of transportation within the urban environment. The required master's project is intended to allow the students a period of directed study that will allow them to integrate their work and to apply this to special areas of their choosing.
- To provide planners with courses essential to understanding the technologies of transportation planning. To provide engineers with a broad background in urban studies and a knowledge of contemporary environmental issues.
- To take advantage of the backgrounds of program participants. The graduate students of both sponsoring departments include both mature professionals returning for advanced degrees and recent graduates with a diversity of specializations.

Prerequisites

Applicants must have satisfactorily completed courses that cover the following or equivalent subject areas:

CE 221 Fundamentals of Transportation Engineering
CE 381 Geotechnical Engineering or
GEOL 201 Physical Geology
CSC 251 Digital Computer Applications
ECON 211 Principles of Economics
ENGL 218 Professional Writing: Argumentation &

Reports

MATH 143 Calculus
PHYS 131 General Physics
SPC 201 Public Speaking
STAT 321 Statistical Analysis

Applicants for admission to the joint program with a specialization in Transportation Planning are expected to:

- Have earned a bachelor's degree from an accredited university or college,
- Have attained a grade point average of 3.0 in last 90 units of undergraduate work,

- Provide results of the Graduate Record Examination (GRE) Aptitude Test to the Admissions Committee.
- Give indications of motivation, maturity, and high standards of academic involvement through work and references (three letters required) and submission of a project or paper demonstrating writing ability,
- Provide a statement (maximum of 300 words) addressing their understanding of and areas of interest in planning, career objectives, and educational objectives.

Applicants lacking prerequisites or other background requirements for classified standing may be admitted on a conditionally classified basis, depending on the results of an individual analysis of their applications.

	<i>Units</i>
Core Courses	68
CE 523 Transportation System Planning (4)	
CE 528 Transportation Analysis or CE 525 Airport Planning and Design (4)	
CE 571 Selected Advanced Laboratory (3)	
CE 574 Computer Applications in C.E. (3)	
CE 591 Graduate Seminar (2)	
CE 599 or CRP 599 Project /Thesis (2,2,2)	
CRP 409 Planning Internship (2)	
CRP 420 Planning Law (4)	
CRP 435 Transportation Theory (3)	
CRP 501 Foundations of Cities and Planning (4)	
CRP 510 Planning Theory (4)	
CRP 513 Planning Research Methods (4)	
CRP 515 Presentation and Communication Techniques for Planners (3)	
CRP 516 Quantitative Methods in Planning (4)	
CRP 518 Policy Analysis for Planners (4)	
CRP 525 Plan Implementation (4)	
CRP 530 Planning Agency Management (3)	
CRP 552 Urban Planning Laboratory (4)	
CSC, MATH, STAT or other approved quantitative methods course (3)	
Emphasis Area (select one of the following)	14
<i>Urban Land Planning Emphasis</i>	
CRP 520 Feasibility Studies in Planning (4)	
CRP 548 Principles of City Design (3)	
CRP 553 Project Planning Laboratory (4)	
Urban Land Planning electives (4)	
<i>Regional and Environmental Planning Emphasis</i>	
CRP 407 Environmental Law (3)	
CRP 545 Environmental Planning, Policies & Principles (4)	
CRP 554 Regional Planning and Analysis (4)	
Regional and Environmental Planning electives (3)	
Approved CE/ENVE electives:	8
Electives may include: CE 422, 424, 522, 525, 527, 528, 529, 573; ENVE 411, 465	

AERONAUTICAL ENGINEERING DEPARTMENT

Aeronautical Engineering Department Office
Engineering Bldg. (13), Room 260
(805) 756-2562 FAX: (805) 756-2376

Aeronautical Engineering Advising Center
Computer Science Bldg. (14), Room 240
(805) 756-1461

Faculty

Department Chair, Russell M. Cummings

Daniel J. Biezad
Jon A. Hoffmann
Faysal A. Kolkailah

Ruben Rojas-Oviedo
Jin Tso

American Helicopter Society, and the Society for the Advancement of Material and Process Engineering. There is also a student chapter of the national aerospace engineering honor society, Sigma Gamma Tau.

The department supports the concept of international education and encourages students to investigate opportunities for overseas study. For further information, see the Study Abroad programs.

Programs

B.S. Aeronautical Engineering

with Concentrations in:

Aeronautics
Astronautics

M.S. Aeronautical Engineering

The Bachelor of Science degree in Aeronautical Engineering prepares students for engineering work related to aerodynamics, flight testing, structures, propulsion, control systems, dynamics, stability and control, and flight simulation for both fixed and rotary wing aircraft, missiles, and spacecraft. The problems faced by the aerospace industry offer an unusual engineering challenge. Much of the analysis and testing must be accomplished at the very frontiers of knowledge. Nevertheless, products must be designed and manufactured; thus, an exceptionally wide range of engineering abilities is required within the industry and government.

Graduates in aeronautical engineering obtain employment in all phases of the aerospace industry such as general design, aerodynamics, stress analysis, flight testing, flight simulation, dynamics, stability and control, and propulsion systems.

The B.S. degree program in Aeronautical Engineering is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. It places emphasis on both analysis and design. Supplementary to both is the basic work in graphics and laboratory. Throughout the entire program there is constant interplay between theory and application. Opportunities are available for advanced elective work in the student's field of special interest.

There are laboratory facilities for fabrication, propulsion, structural test, aerodynamics, dynamics, flight simulation and flight test, and design.

There are three student chapters of the national societies—the American Institute of Aeronautics and Astronautics, the

B.S. AERONAUTICAL ENGINEERING

Indented courses to be taken in sequence. For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser. Courses are displayed by year.

	Units
Freshman	
AERO 121 Aerospace Fundamentals	1
ETME 141 Applied Descriptive Geometry	2
IME 122 Manufacturing Survey	1
BIO 220 Physiology and Biological Adaptation (B.1.b., E.2.)	4
CHEM 124 General Chemistry (B.1.a.)	4
CSC 251 Digital Computer Applications (F.1.)	2
ENGL 114 Writing: Exposition (A.1.)	4
ENGL 125/PHIL 125/SPC 125 Critical Thinking (A.2.)	3
ENGL 218 Professional Writing: Argumentation and Reports (A.4.)	4
MATH 141 Calculus I (B.2.)	4
MATH 142 Calculus II (B.2.)	4
MATH 143 Calculus III	4
PHYS 131 General Physics (B.1.a.)	4
PHYS 132 General Physics	4
PSY 201/PSY 202 General Psychology (E.1.)	3
¹ Fine and performing arts elective (C.2.)	3
	51
Sophomore	
AERO 215 Aerospace Engineering Analysis I	2
CE 204 Strength of Materials	3
CE 205, 206 Strength of Materials and Lab	2,1
EE 201, 251 Electric Circuit Theory and Lab	3,1
ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
PHYS 133 General Physics	4
PHYS 211 Modern Physics I	4
ANT 201/GEOG 150/SOC 105 (D.4.a.)	3
ECON 201 Survey of Economics or ECON 211 Principles of Economics (D.3.)	3
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
CSC 311 Numerical Engineering Analysis	4
SPC 201 Public Speaking or SPC 202 Principles of Speech Communication (A.3.)	3
¹ Critical reading elective (C.1.)	3
Manufacturing processes elective, to be selected from IME 141, 142, 143, or IT 141	1
	51

Junior

AERO 301 Aerothermodynamics	5
AERO 302 Aerothermodynamics	5
AERO 303 Aerothermodynamics and AERO 304 Experimntl. Aerothermodynamics	3,2
AERO 306 Aerodynamics I	3
AERO 307 Wind Tunnel and Flight Test Laboratory	3
AERO 315 Aerospace Engineering Analysis II	3
AERO 320 Fundamentals of Guidance and Control	3
AERO 330 Stress Analysis	4
EE 321, 361 Electronics and Lab	3,1
MATE 206 Materials Engineering	3
PHIL 230/PHIL 231 Philosophical Classics (C.1.)	3
HIST 204 History of American Ideals and Institutions (D.1.)	3
HIST 315 Modern World History (D.2.)	3
POLS 210 American and California Government (D.1.)	3
¹ ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)	3
¹ Literature, philosophy, arts elective (300-400 level) (C.3)	3
	56

Senior

AERO 401 Propulsion Systems	4
AERO 404 Gas Dynamics	3
AERO 420 Stability and Control of Aerospace Vehicles	4
AERO 430 Aerospace Structural Analysis	4
AERO 432 Experimental Stress Analysis	1
AERO 461 Senior Project	2
AERO 462 Senior Project	3
¹ Arts and humanities elective (Area C)	3
¹ Critical reading elective (C.1.)	3
Required and elective courses to complete concentration	25
	52
	210

¹ To be selected in accordance with the General Education-Breadth and A.B.E.T. requirements. See adviser and page 77 of this catalog.

B.S. AERONAUTICAL ENGINEERING

Courses are displayed by Major, Support, Concentration, General Education and Breadth, and Electives.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements.

	Units
AERO 121 Aerospace Fundamentals	1
AERO 215 Aerospace Engineering Analysis I	2
AERO 301 Aerothermodynamics	5
AERO 302 Aerothermodynamics	5
AERO 303 Aerothermodynamics and	
AERO 304 Experimental Aerothermodynamics	3,2
AERO 306 Aerodynamics I	3
AERO 307 Wind Tunnel and Flight Test Laboratory	3
AERO 315 Aerospace Engineering Analysis II	3
AERO 320 Fundamentals of Guidance and Control ..	3
AERO 330 Stress Analysis	4
AERO 401 Propulsion Systems	4
AERO 404 Gas Dynamics	3
AERO 420 Stability and Control of Aerospace	
Vehicles	4
AERO 430 Aerospace Structural Analysis	4
AERO 432 Experimental Stress Analysis	1
AERO 461 Senior Project	2
AERO 462 Senior Project	3
CE 204 Strength of Materials	3
CE 205, 206 Strength of Materials and Lab	2,1
EE 201, 251 Electric Circuit Theory and Lab	3,1
PHYS 131 General Physics (B.1.a.)*	4
PHYS 132 General Physics	4
PHYS 133 General Physics	4
Concentration courses (see below)	25
	<hr/> 102

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

CHEM 124 General Chemistry (B.1.a.)*	4
CSC 251 Digital Computer Applications (F.1.)*	2
CSC 311 Numerical Engineering Analysis	4
EE 321, 361 Electronics and Lab	3,1
ETME 141 Applied Descriptive Geometry	2
IME 122 Manufacturing Survey	1
Manufacturing processes elective, to be selected	
from IME 141, 142, 143, or IT 141	1
MATE 206 Materials Engineering	3
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II (B.2.)*	4
MATH 143 Calculus III	4
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
ME 211 Engineering Statics	3

ME 212 Engineering Dynamics	3
PHYS 211 Modern Physics I	4
	<hr/> 51

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Major and Support courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.) ENGL 218	
recommended	
Area B:	2
A minimum of 18 units is required; 16 of the units	
are in Major and Support	
Physical science (B.1.a.)* see Major and Support	
Courses	
Life science (B.1.b.)	
BIO 220 recommended for B.1.b. and E.2.	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400	
level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective	
(300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
BIO 220 recommended for E.2. and B.1.b.	
Area F:	0
A minimum of 2 units is required; 2 of the units are	
in Support	
Computer literacy (F.1.)* see Support Courses	
A minimum of 75 units is required; 18 of the units	
are in Support	<hr/> 57

ELECTIVES	0
	<hr/> 210

CONCENTRATIONS (select one)**Aeronautics Concentration**

AERO 405 Aerodynamics II	3
AERO 443 Flight Vehicle Design	2
AERO 444 Flight Vehicle Design	4
AERO 445 Flight Vehicle Design	4
Aeronautics electives	12
	<hr/>
	25

Astronautics Concentration

AERO 451 Orbital Mechanics I	3
AERO 447 Spacecraft Design	2
AERO 448 Spacecraft Design	4
AERO 449 Spacecraft Design	4
Astronautics electives	12
	<hr/>
	25

See COURSES OF INSTRUCTION section of this catalog for description of courses in Aeronautical Engineering and other subjects.

MASTER OF SCIENCE DEGREE IN AERONAUTICAL ENGINEERING

General Characteristics

The Master of Science program in Aeronautical Engineering prepares the student for entry into a well established field of aeronautical engineering. In addition, the subject matter relative to flight simulation and controls, structures, and aerothermal sciences has been integrated into the program. The M.S. program in Aeronautical Engineering emphasizes engineering science and research activity. The degree increases a student's capability for more complex research, development, and innovative design, and prepares the student for future graduate study in engineering, leading to the Doctor of Engineering or Ph.D. degree.

Prerequisites

For admission as a classified graduate student, an applicant must hold a bachelor's degree in engineering (preferably aeronautical engineering) or a closely related physical science with a minimum grade point average of 3.0 in the last 90 quarter units (60 semester units) attempted.

Applicants are required to submit satisfactory scores for the General (Aptitude) Test and Subject (Advanced) Test of the Graduate Record Examination in engineering.

An applicant who meets these standards but lacks prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies before advancement to classified graduate standing.

Information pertaining to specific requirements for admission to graduate standing (classified or conditionally classified) may be obtained from the Graduate Coordinator, Department of Aeronautical Engineering.

Program of Study

Graduate students must file a formal study plan with their adviser, department, college and university graduate studies office by no later than the end of the quarter in which the 12th unit of approved courses is completed.

The formal program of study must include a minimum of 45 units (at least 24 of which must be at the 500 level).

A thesis or project is required as a culminating experience.

M.S. AERONAUTICAL ENGINEERING

	Units
Required Courses	25
AERO 520 Theoretical Aerodynamics (3)	
AERO 522 Boundary Layer Theory (3)	
AERO 535 Advanced Aerospace Structural Analysis (3)	
AERO 540 Elements of Rocket Propulsion (3)	
AERO 550 Analysis and Design of Flight Control Systems (3)	
AERO 590 Graduate Seminar (1)	
AERO 599 Design Project (Thesis) (2) (2) (5)	
Adviser approved electives	9
Advanced Mathematics/Analytical Methods for Engineers	11
MATH 501, MATH 502 Methods of Applied Mathematics I and II (4) (4)	
AERO 515 Continuum Mechanics (3)	
	<hr/> 45

CIVIL AND ENVIRONMENTAL ENGINEERING DEPARTMENT

**Engineering Bldg. (13), Room 263
(805) 756-2947**

Faculty

Chair, Edward A. Nowatzki

Alypios E. Chatziioanou	Kurt C. K. Lo
Harold M. Cota	H. Mallareddy
Jay S. DeNatale	Sara Moazzami
Stephen L. M. Hockaday	Robert E. Sennett
Carl C. F. Hsieh	S. Somayaji
Robert J. Lang	Edward C. Sullivan
Stuart E. Larsen	Samuel A. Vigil

Programs

B.S. Civil Engineering

B.S. Environmental Engineering

M.S. Civil and Environmental Engineering

CIVIL ENGINEERING

The Board of Directors of the American Society of Civil Engineers has defined Civil Engineering as "...the profession in which a knowledge of the mathematical and physical sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the progressive well-being of mankind in creating, improving and protecting the environment, in providing facilities for community living, industry and transportation, and in providing structures for the use of mankind."

The Bachelor of Science degree in Civil Engineering emphasizes the study of engineering principles and the application of scientific knowledge and technology for the betterment of humankind. The program stresses the team design concept and systems approach to problem solving and is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Graduates of the program are trained for the expanding needs of society in transportation, geotechnical engineering, water resources, structures and the environment under the broad Civil Engineering degree. The emphasis is on preparation for immediate entry into the profession. Students completing the program find a wide variety of positions available in local, state, and federal government service or with private engineering firms. These positions involve the planning, design, and construction of civil engineering projects.

The curriculum includes surveying, structural engineering, hydraulics, geotechnical engineering, environmental engineering, and transportation planning—all based upon broad coverage of the engineering sciences and basic sciences, mathematics, social sciences, and humanities. The program is oriented toward the practical problems of the industrial world, and adequate scientific depth is maintained so that graduates are readily accepted into graduate programs in civil engineering.

The Society of Civil Engineers (SCE) student organization sponsors a variety of extracurricular professional development, community service, and social activities to supplement the formal academic program. SCE is made up of chartered student chapters of three different professional organizations: the American Public Works Association (APWA), the American Society of Civil Engineers (ASCE), and the Institute of Transportation Engineers (ITE). SCE is recognized as one of the nation's premiere student chapters.

ENVIRONMENTAL ENGINEERING

The Bachelor of Science degree in Environmental Engineering is concerned with the interrelation of people, materials, and processes in a complex and changing environment. The broad field of environmental engineering includes control of air and water pollution, industrial hygiene, noise and vibration control, and solid waste and hazardous waste management. Cal Poly has one of the few undergraduate programs in this field.

The program offers a sound background in the fundamentals of thermodynamics, heat transfer, fluid mechanics, mass transfer, water resources and geotechnical engineering. The problem-oriented approach to instruction, in modern well-equipped laboratories, provides an excellent opportunity to gain understanding and experience. The program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

The Society of Environmental Engineers offers technical programs and other activities, including field trips each year to the Los Angeles and San Francisco areas to study typical installations of systems. Student memberships also are available in the Air and Waste Management Association, the California Water Pollution Control Association, and the Water Environment Federation.

An engineering approach to the subject enables graduates to pursue careers in industry, consulting firms, and public agencies concerned with air and water pollution control, groundwater, potable water treatment, solid waste management, and hazardous waste management.

B.S. CIVIL ENGINEERING

Indented courses to be taken in sequence. For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser. Obtain flow chart at department office. Courses listed below are grouped by year.

	Units		
Freshman		CE 352, CE 353 Structural Analysis I and II.....	3,3
CE 111, CE 112 Civil Engineering Fundamentals I, II.....	1,2	CE 355 Reinforced Concrete Design.....	3
CHEM 124 General Chemistry (B.1.a.)	4	CE 381 Geotechnical Engineering	4
CHEM 125 General Chemistry	4	ENVE 331 Introduction to Environmental Engineering	3
ENGL 114 Writing: Exposition (A.1.)	4	ME 302 Thermodynamics.....	3
ENGL 125/PHIL 125/SPC 125 Critical Thinking (A.2.)	3	ME 341 Fluid Mechanics.....	3
ENGL 218 Professional Writing: Argumentation and Reports (A.4.)	4	CSC 331/CSC 332/IME 314.....	3
ETME 141 Applied Descriptive Geometry	2	BIO 220 Physiology and Biological Adaptation (B.1.b., E.2.)	4
MATH 141 Calculus I (B.2.)	4	HIST 204 History of American Ideals and Institutions (D.1.)	3
MATH 142 Calculus II	4	HIST 315 Modern World History (D.2.)	3
MATH 143 Calculus III	4	PSY 201/PSY 202 General Psychology (E.1.)	3
PHYS 131 General Physics (B.1.a.)	4	¹ ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)	3
PHYS 132 General Physics.....	4	PHIL 230/PHIL 231 Philosophical Classics (C.1.)	3
CSC 251 Digital Computer Applications or CSC 204 C and UNIX (F.1.)	2	¹ Fine and performing arts elective (C.2.)	3
¹ Critical reading elective (C.1.)	3		52
ANT 201/GEOG 150/SOC 105 (D.4.a.)	3		
	52	Senior	
Sophomore		CE 453 Structural Steel Design	3
CE 204 Strength of Materials.....	3	CE 407 Structural Dynamics	4
CE 205, 206 Strength of Materials and Lab.....	2,1	CE 421 Traffic Engineering or another 400-level transportation course	4
CE 221 Fundamentals of Transportation Engineering	4	CE 440 Hydraulic Systems Engineering	3
CE 259 Civil Engineering Materials	2	CE 454 Structural Design.....	4
AE 237 Engineering Surveying I.....	2	CE 461 Senior Project.....	2
AE 238 Engineering Surveying II	2	CE 462 Senior Project.....	2
EE 201 Electric Circuits Theory.....	3	CE 481 Analysis and Design of Shallow Foundations	4
GEOL 201 Physical Geology	3	ENVE 438 Water and Wastewater Treatment Design	3
MATE 206, MATE 241 Materials Engineering and Lab.....	3,1	SPC 201 Public Speaking or SPC 202 Principles of Speech Communication (A.3.)	3
MATH 241 Calculus IV	4	STAT 312 Statistical Methods for Engineers (B.2.)	3
MATH 242 Differential Equations	4	¹ Arts and humanities elective (Area C)	3
ME 211 Engineering Statics	3	¹ Literature, philosophy, arts elective (300-400 level) (C.3.)	3
ME 212 Engineering Dynamics	3	Adviser approved technical electives	12
ECON 201 Principles of Economics (D.3.)	3		53
PHYS 133 General Physics.....	4		210
POLS 210 American and California Government (D.1.)	3		
¹ Critical reading elective (C.1.)	3		
	53		
Junior			
CE 336 Water Resources Engineering	4		
CE 337 Hydraulics Laboratory	1		

¹ To be selected in accordance with the General Education-Breadth and A.B.E.T. requirements. (Please see page 77 of this catalog.)

B.S. CIVIL ENGINEERING

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

	Units
CE 111, CE 112 Civil Engineering Fundamentals I, II.	1,2
CE 204 Strength of Materials	3
CE 205, 206 Strength of Materials and Lab.....	2,1
CE 221 Fundamentals of Transportation Engineering.	4
CE 259 Civil Engineering Materials	2
CE 336 Water Resources Engineering.....	4
CE 337 Hydraulics Laboratory	1
CE 352, CE 353 Structural Analysis I and II	3,3
CE 355 Reinforced Concrete Design	3
CE 381 Geotechnical Engineering	4
CE 407 Structural Dynamics	4
CE 421 Traffic Engineering or another 400-level transportation course.....	4
CE 440 Hydraulic Systems Engineering.....	3
CE 453 Structural Steel Design.....	3
CE 454 Structural Design	4
CE 461 Senior Project.....	2
CE 462 Senior Project.....	2
CE 481 Analysis and Design of Shallow Foundations	4
Adviser approved technical electives	12

71

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

AE 237 Engineering Surveying I.....	2
AE 238 Engineering Surveying II.....	2
CHEM 124 General Chemistry (B.1.a.)*	4
CHEM 125 General Chemistry	4
CSC 251 Digital Computer Applications or CSC 204 C and UNIX (F.1.)*	2
CSC 331/CSC 332/IME 314	3
EE 201 Electric Circuits Theory.....	3
ENVE 331 Introduction to Environmental Engineering	3
ENVE 438 Water and Wastewater Treatment Design.	3
ETME 141 Applied Descriptive Geometry	2
GEO 201 Physical Geology	3
MATE 206, MATE 241 Materials Engineering and Lab.....	3,1
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II (B.2.)*	4
MATH 143 Calculus III.....	4
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
ME 302 Thermodynamics	3
ME 341 Fluid Mechanics	3
PHYS 131 General Physics (B.1.a.)*	4

PHYS 132 General Physics	4
PHYS 133 General Physics	4
STAT 312 Statistical Methods for Engineers	3

82

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Major and Support courses.

Area A: 14

ENGL 114 (A.1.)

ENGL 125/PHIL 125/SPC 125 (A.2.)

SPC 201/SPC 202 (A.3.)

ENGL 215/ENGL 218 (A.4.) ENGL 218
recommended

Area B: 2

A minimum of 18 units is required; 16 of the units
are in Support

Physical science (B.1.a.)* see Major and Support
Courses

Life science (B.1.b.)

BIO 220 recommended for B.1.b and E.2.

Mathematics/statistics (B.2.)* see Support Courses

Area C: 18

PHIL 230/PHIL 231 (C.1.)

Critical reading electives (C.1.)

Fine and performing arts elective (C.2.)

Literature, philosophy, arts elective (300–400
level) (C.3.)

Arts and humanities elective (Area C)

Area D: 18

HIST 204 (D.1.), POLS 210 (D.1.)

HIST 315 (D.2.)

ECON 201/211/222 (D.3.)

ECON 201 recommended.

ANT 201/GEOG 150/SOC 105 (D.4.a.)

ANT/BUS/ECON/GEOG/POLS/SOC/WS elective
(300–400 level) (D.4.b.)

Area E: 5

PSY 201/PSY 202 (E.1.)

BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)

BIO 220 recommended for E.2. and B.1.b.

Area F: 0

A minimum of 2 units is required; 2 of the units are
in Support

Computer literacy (F.1.)* see Support Courses

A minimum of 75 units is required; 18 of the units
are in Support

57

ELECTIVES..... 0

210

B.S. ENVIRONMENTAL ENGINEERING

Indented courses to be taken in sequence. For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser. Obtain flow chart at department office. Courses listed below are grouped by year.

	Units		
Freshman		ENVE 309 Noise and Vibration Control.....	3
CE 112 Civil Engineering Fundamentals II	2	ENVE 316 Automatic Process Control.....	2
ETME 141 Applied Descriptive Geometry	2	ENVE 325 Environmental Air Quality.....	3
BIO 220 Physiology and Biological Adaptation (B.1.b., E.2.)	4	ENVE 331 Introduction to Environmental Engineering	3
CHEM 124 General Chemistry (B.1.a.)	4	ENVE 426 Air Quality Measurements	3
CHEM 125 General Chemistry.....	4	EE 201 Electric Circuit Theory	3
CHEM 129 General Chemistry.....	4	EE 251 Electric Circuit Laboratory	1
ENGL 114 Writing: Exposition (A.1.).....	4	ME 313 Heat Transfer.....	3
ENGL 125/PHIL 125/SPC 125 Critical Thinking (A.2.)	3	ME 341 Fluid Mechanics.....	3
MATH 141 Calculus I (B.2.)	4	HIST 204 History of American Ideals and Institutions (D.1.).....	3
MATH 142 Calculus II	4	SPC 201 Public Speaking or SPC 202 Principles of Speech Communication (A.3.).....	3
MATH 143 Calculus III	4	PHIL 230/PHIL 231 Philosophical Classics (C.1.).....	3
PHYS 131 General Physics (B.1.a.).....	4	PSY 201/PSY 202 General Psychology (E.1.).....	3
PHYS 132 General Physics	4	¹ Critical reading elective (C.1.).....	3
ANT 201/GEOG 150/SOC 105 (D.4.a.).....	3	¹ Fine and performing arts elective (C.2.).....	3
	50		54
Sophomore		Senior	
CE 204 Strength of Materials.....	3	CE 434 Groundwater Hydraulics and Hydrology	3
CE 205 Strength of Materials	2	CE 440 Hydraulic Systems Engineering	3
CE 221 Fundamentals of Transportation Engineering .	4	ENVE 411 Air Pollution Control.....	3
ME 211 Engineering Statics	3	ENVE 421 Mass Transfer Operations	3
ME 212 Engineering Dynamics	3	ENVE 434 Water Quality Measurements	2
ME 302 Thermodynamics	3	ENVE 436 Introduction to Hazardous Waste Management.....	3
CHEM 326 Survey of Organic Chemistry	4	ENVE 438 Water and Wastewater Treatment Design .	3
MATH 241 Calculus IV	4	ENVE 439 Solid Waste Management	3
MATH 242 Differential Equations.....	4	ENVE 442 Advanced System Design	3
PHYS 133 General Physics.....	4	ENVE 461, ENVE 462 Senior Project	2,2
CSC 251 Digital Computer Applications or CSC 204 C and UNIX (F.1.)	2	HIST 315 Modern World History (D.2.).....	3
ECON 211 Principles of Economics (D.3.)	3	¹ ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level)(D.4.b.).....	3
ENGL 218 Professional Writing: Argumentation and Reports (A.4.)	4	¹ Arts and humanities elective (Area C)	3
POLS 210 American and California Government (D.1.)	3	¹ Literature, philosophy, arts elective (300-400 level) (C.3.)	3
STAT 312 Statistical Methods for Engineers (B.2.)	3	Approved technical electives	12
¹ Critical reading elective (C.1.).....	3		54
	52		210
Junior		See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Civil Engineering, Environmental Engineering, and other subjects.	
CE 336 Water Resources Engineering.....	4	¹ To be selected in accordance with the General Education-Breadth requirements. (Please see page 77 of this catalog.)	
CE 337 Hydraulics Laboratory	1		
CE 381 Geotechnical Engineering	4		
ENVE 304 Thermodynamics of Processes.....	3		

B.S. ENVIRONMENTAL ENGINEERING

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

	Units
CE 112 Civil Engineering Fundamentals II	2
CE 204 Strength of Materials	3
CE 205 Strength of Materials	2
CE 221 Fundamentals of Transportation Engineering	4
CE 336 Water Resources Engineering	4
CE 337 Hydraulics Laboratory	1
CE 381 Geotechnical Engineering	4
CE 434 Groundwater Hydraulics and Hydrology	3
CE 440 Hydraulic Systems Engineering	3
ENVE 304 Thermodynamics of Processes	3
ENVE 309 Noise and Vibration Control	3
ENVE 316 Automatic Process Control	2
ENVE 325 Environmental Air Quality	3
ENVE 331 Introduction to Environmental Engineering	3
ENVE 411 Air Pollution Control	3
ENVE 421 Mass Transfer Operations	3
ENVE 426 Air Quality Measurements	3
ENVE 434 Water Quality Measurements	2
ENVE 436 Introduction to Hazardous Waste Management	3
ENVE 438 Water and Wastewater Treatment Design	3
ENVE 439 Solid Waste Management	3
ENVE 442 Advanced System Design	3
ENVE 461, ENVE 462 Senior Project	2,2
Approved technical electives	12
	<hr/> 79

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

CHEM 124 General Chemistry (B.1.a.)*	4
CHEM 125 General Chemistry	4
CHEM 129 General Chemistry	4
CHEM 326 Survey of Organic Chemistry	4
CSC 251 Digital Computer Applications or CSC 204 C and UNIX (F.1.)*	2
EE 201 Electric Circuit Theory	3
EE 251 Electric Circuit Laboratory	1
ETME 141 Applied Descriptive Geometry	2
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II (B.2.)*	4
MATH 143 Calculus III	4
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
ME 302 Thermodynamics	3
ME 313 Heat Transfer	3
ME 341 Fluid Mechanics	3
PHYS 131 General Physics (B.1.a.)*	4

PHYS 132 General Physics	4
PHYS 133 General Physics	4
STAT 312 Statistical Methods for Engineers	3

74**GENERAL EDUCATION AND BREADTH**

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Major and Support courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.) ENGL 218 recommended	
Area B:	2
<i>A minimum of 18 units is required; 16 of the units are in Major and Support</i>	
Physical science (B.1.a.)* see Major and Support Courses	
Life science (B.1.b.)	
BIO 220 recommended for B.1.b and E.2.	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.) ECON 201 recommended.	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
BIO 220 recommended for E.2. and B.1.b.	
Area F:	0
<i>A minimum of 2 units is required; 2 of the units are in Support</i>	
Computer literacy (F.1.)* see Support Courses	
<i>A minimum of 75 units is required; 18 of the units are in Support</i>	<hr/> 57
ELECTIVES	0
	<hr/> <hr/> 210

MASTER OF SCIENCE DEGREE IN CIVIL AND ENVIRONMENTAL ENGINEERING

General Characteristics

The Master of Science program in Civil and Environmental Engineering has the following objectives:

- Job-entry education for the more complex areas of engineering, such as research and development, innovative design, systems analysis and design, and managerial engineering;
- Updating and upgrading opportunities for practicing engineers;
- Graduate preparation for further study in engineering, leading to the Doctor of Engineering or Ph.D. degree;
- A base which allows graduates to maintain currency in their fields.

Prerequisites

For admission as a classified graduate student, an applicant must hold a bachelor's degree in engineering or a closely related physical science with a minimum grade point average of 3.0 in the last 90 quarter units (60 semester units) attempted. Applicants for graduate engineering programs are required to submit satisfactory scores for the General (Aptitude) Test of the Graduate Record Examination. An applicant who meets these standards but lacks prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies before advancement to classified graduate standing.

Information pertaining to specific requirements for admission to graduate standing (classified or conditionally classified) may be obtained from the Graduate Coordinator, Civil and Environmental Engineering Department.

Program of Study

Graduate students must file a formal study plan with their adviser, department, college and university graduate studies office by no later than the end of the quarter in which the 12th unit of approved courses is completed.

The formal program of study must include a minimum of 45 units (at least 24 of which must be at the 500 level). With the graduate adviser's approval, students will be expected to select their elective units in one of the following areas of study: geotechnical engineering, transportation and planning, or water resources and environmental engineering.

The broad curriculum requirements for the M.S. in Civil and Environmental Engineering are:

- a) a core of 14 units as required;
- b) a minimum of 22 units of adviser approved electives within the major;
- c) a minimum of 9 units of adviser-approved electives outside the major;
- d) at least 24 units of the 45 unit program at the 500 level; and
- e) a comprehensive written examination (course work option) or an oral defense examination (thesis option).

Two program options are available for M.S. in Civil and Environmental Engineering students. The thesis option involves 36 units of adviser-approved coursework, 9 units of CE 599 thesis research/design, and an oral thesis defense examination administered by a panel of three faculty. The non-thesis option involves 45 units of adviser-approved coursework and a written comprehensive examination administered by a panel of three faculty. A student will have a maximum of three opportunities to pass this written comprehensive examination.

CURRICULUM FOR M.S. CIVIL AND ENVIRONMENTAL ENGINEERING

Required Courses	Units 14
CE 574 Computer Applications in Civil Engineering (3)	
CE 591 Graduate Seminar (2)	
CE 599/ENVE 599 Design Project (Thesis) (9) or additional 9 units of adviser approved analysis and design electives within the major (non-thesis option) and Comprehensive Examination.	
Adviser approved analysis and design CE and ENVE electives (to be selected from the following list after consultation with your academic adviser and the CE/ENVE graduate coordinator):.....	22
Adviser approved analysis electives outside the major (to be selected after consultation with your academic adviser and the CE/ENVE Graduate Coordinator).	9
	<hr/> 45

CE 599 Design Project Thesis (9)
 ENVE 411 Air Pollution Control (3)
 ENVE 421 Mass Transfer Operations (3)
 ENVE 434 Water Quality Measurements (2)
 ENVE 435 Principles of Water and Wastewater Engineering (3)
 ENVE 436 Introduction to Hazardous Waste Management (3)
 ENVE 438 Water and Wastewater Treatment Design (3)
 ENVE 439 Solid Waste Management (3)
 ENVE 465 Environmental Management and Urban Systems (2)
 ENVE 534 Advanced Design of Pollution Control Systems (3)
 ENVE 535 Advanced Wastewater Treatment (3)
 ENVE 536 Biological Wastewater Treatment Processes Engineering (3)
 ENVE 541 Resource and Energy Recovery (3)
 ENVE 551 Environmental Unit Operations (4)

Analysis and design CE and ENVE electives:

CE 405 Advanced Strength of Materials (3)
 CE 407 Structural Dynamics (4)
 CE 421 Traffic Engineering (4)
 CE 422 Highway Geometrics and Design (4)
 CE 424 Public Transportation (4)
 CE 431 Coastal Hydraulics (3)
 CE 434 Ground Water Hydraulics and Hydrology (3)
 CE 440 Hydraulic Systems Engineering (3)
 CE 453 Structural Steel Design (3)
 CE 454 Structural Design (4)
 CE 481 Analysis & Design of Shallow Foundations (4)
 CE 521 Airfield and Highway Pavement Design (4)
 CE 522 Advanced Transportation Design (4)
 CE 523 Transportation Systems Planning (4)
 CE 525 Airport Planning and Design (4)
 CE 527 Traffic Engineering - Operations and Controls (4)
 CE 528 Transportation Analysis (4)
 CE 529 Modeling and Simulation in Transportation (4)
 CE 533 Advanced Water Resources Engineering (3)
 CE 554 Matrix Analysis of Structures (3)
 CE 555 Advanced Civil Engineering Materials Laboratory (2)
 CE 558 Introduction to Finite Element Analysis (3)
 CE 559 Advanced Structural Design (3)
 CE 571 Selected Advanced Laboratory (1-3)
 CE 573 Public Works Administration (3)
 CE 581 Advanced Geotechnical Engineering (3)
 CE 582 Advanced Geotechnical Testing (3)
 CE 583 Soil Dynamics (3)
 CE 584 Lateral Support Systems (3)
 CE 585 Slope Stability Analysis (3)
 CE 587 Analysis and Design of Deep Foundations (3)

COMPUTER ENGINEERING PROGRAM

**College of Engineering Advising Center,
Computer Science Building (14), Room 240
(805) 756-1461**

Faculty

Director, James G. Harris

James L. Beug	Wayne E. McMorran
Joseph Grimes	S. Ronald Oliver
John Hsu	Clinton A. Staley
C. Arthur MacCarley	Daniel J. Stearns

Program

B.S. Computer Engineering

The goal of the B.S. program in Computer Engineering is the education of those students with an interest in designing computer based systems with an emphasis on integrating hardware and software systems.

The program offers a firm foundation in both electrical engineering and computer science. This balanced background allows the graduate to make intelligent decisions in the area of the definition and design of systems, hardware and software, and the trade-offs among these components of design.

This integrated approach will allow students to work effectively in such areas as digital systems simulation and digital control systems. Knowledge and skills in the technical areas of computer architecture and structures will provide the basic understanding necessary to work with computer networks and communications. A thorough knowledge of modern microprocessors enables the graduate to apply these machines to such diverse fields as robotics and data acquisition. Twelve units of technical electives allow the student to specialize in an area of special interest to the student and of expertise of the faculty.

In addition to a sound theoretical background in the field of computer engineering, the student will encounter many practical design courses and problems. Laboratory courses supplement the program to bring "hands on" skills in all areas of study. Students will be exposed to the wide variety of computing equipment that is available on the campus: microprocessor development systems, networks of personal computers and workstations, minicomputers, and mainframes.

Active student groups of interest to computer engineering majors include the Association for Computing Machinery, the IEEE Computer Society, and the IEEE Robotics Society.

B.S. COMPUTER ENGINEERING

Indented courses to be taken in sequence. For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser. Courses are displayed by year.

	Units		
Freshman		EE 307, 347 Digital Integrated Electronics and Lab....	3,1
EE 112 Electric Circuit Analysis I	2	CPE 319, 359 Digital System Design and Lab	3,1
CSC 118 Fundamentals of Computer Science I (F.1.).	4	BIO 220 Physiology and Biological Adaptations	
CSC 218 Fundamentals of Computer Science II	3	(B.1.b. and E.2.).....	4
CPE 219, 259 Logic and Switching Circuits and Lab .	3,1	ECON 201/ECON 211/ECON 222 (D.3.).....	3
ANT 201/GEOG 150/SOC 105 (D.4.a.).....	3	HIST 204 History of American Ideals and	
CHEM 124 General Chemistry (B.1.a.)	4	Institutions (D.1.).....	3
ENGL 114 Writing: Exposition (A.1.).....	4	PSY 201/PSY 202 General Psychology (E.1.).....	3
ENGL 125/PHIL 125/SPC 125 Critical Thinking (A.2.)	3	¹ Critical reading electives (C.1.).....	6
ENGL 215 Writing: Argumentation or		Adviser approved technical electives	6
ENGL 218 Professional Writing: Argumentation			
and Reports (A.4.)	4		51
MATH 141 Calculus I (B.2.)	4	Senior	
MATH 142 Calculus II (B.2.)	4	CPE 461 Senior Project	3
MATH 143 Calculus III	4	CPE 462 Senior Project	2
PHYS 131 General Physics (B.1.a.).....	4	CPE 463 Undergraduate Seminar.....	1
PHYS 133 General Physics	4	CPE 316 Computer Architecture III.....	4
	51	CPE 404 Computer Networks	4
Sophomore		CSC 440 Software Engineering I.....	3
CPE 215 Computer Architecture I	4	CSC 450 Programming Languages II: Description	
CSC 245 Discrete Structures	3	and Analysis	4
CSC 345 Data Structures.....	3	CSC 453 Introduction to Operating Systems.....	4
EE 211, 241 Electric Circuit Analysis II and Lab	3,1	CPE 406 Microprocessor System Design	
EE 212, 242 Electric Circuit Analysis III and Lab ...	3,1	Methodologies	3
EE 208, 248 Electronic Devices and Lab	3,1	CPE 446 Microprocessor Interfacing Laboratory.....	1
MATH 241 Calculus IV	4	HIST 315 Modern World History (D.2.).....	3
MATH 242 Differential Equations.....	4	PHIL 230/PHIL 231 Philosophical Classics (C.1.).....	3
MATH 317 Topics in Engineering Mathematics .	4	¹ ANT/BUS/ECON/GEOG/POLS/SOC/WS elective	
ME 211 Engineering Statics	3	(300-400 level) (D.4.b.).....	3
PHYS 132 General Physics	4	¹ Arts and humanities elective (Area C)	3
PHYS 211 Modern Physics	4	¹ Fine and performing arts elective (C.2.).....	3
POLS 210 American and California		¹ Literature, philosophy, arts elective (300-400	
Government (D.1.)	3	level) (C.3.)	3
SPC 201 Public Speaking or		Adviser approved technical electives	6
SPC 202 Principles of Speech			53
Communication (A.3.).....	3		209
STAT 312 Statistical Methods for Engineers	3	See COURSES OF INSTRUCTION section of this catalog for	
	54	descriptions of courses in Computer Engineering, Computer Science,	
Junior		Electrical Engineering, and other subjects.	
CSC 240 Programming Environments I	3	¹ To be selected in accordance with the General Education-Breadth	
CPE 315 Computer Architecture II	4	requirements. (Please see page 77 of this catalog.)	
CSC 351 Programming Languages I: Design.....	3		
EE 301, 341 Linear Systems Analysis and Lab.....	3,1		
EE 302, 342 Linear Control Systems and Lab.....	3,1		

B.S. COMPUTER ENGINEERING

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements.

	Units
EE 112 Electric Circuit Analysis I	2
CSC 118 Fundamentals of Computer Science I (F.1.)*	4
EE 208, 248 Electronic Devices and Lab.....	3,1
EE 211, 241 Electric Circuit Analysis II and Lab	3,1
EE 212, 242 Electric Circuit Analysis III and Lab.....	3,1
CPE 215 Computer Architecture I	4
CSC 218 Fundamentals of Computer Science II.....	3
CPE 219, 259 Logic and Switching Circuits and Lab	3,1
CSC 240 Programming Environments I	3
CSC 245 Discrete Structures	3
EE 301, 341 Linear Systems Analysis and Lab.....	3,1
EE 302, 342 Linear Control Systems and Lab	3,1
EE 307, 347 Digital Integrated Electronics and Lab ...	3,1
CPE 315 Computer Architecture II	4
CPE 316 Computer Architecture III	4
CPE 319, 359 Digital System Design and Lab.....	3,1
CSC 345 Data Structures.....	3
CSC 351 Programming Languages I: Design.....	3
CPE 404 Computer Networks	4
CPE 406 Microprocessor System Design Methodologies.....	3
CSC 440 Software Engineering I	3
CPE 446 Microprocessor Interfacing Laboratory	1
CSC 450 Programming Languages II: Description and Analysis.....	4
CSC 453 Introduction to Operating Systems	4
CPE 461 Senior Project.....	3
CPE 462 Senior Project.....	2
CPE 463 Undergraduate Seminar.....	1
Adviser approved technical electives	12

102

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

CHEM 124 General Chemistry (B.1.a.)*	4
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II (B.2.)*	4
MATH 143 Calculus III.....	4
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
MATH 317 Topics in Engineering Mathematics.....	4
ME 211 Engineering Statics	3
PHYS 131 General Physics (B.1.a.)*	4
PHYS 132 General Physics	4
PHYS 133 General Physics	4

PHYS 211 Modern Physics	4
STAT 312 Statistical Methods for Engineers	3

50

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Major and Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/218 (A.4.)	
Area B:	2
<i>A minimum of 18 units is required; 16 of the units are in Support</i>	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)	
BIO 220 recommended for B.1.b. and E.2.	
Mathematics/statistics* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
BIO 220 recommended for E.2. and B.1.b.	
Area F:	0
<i>A minimum of 2 units is required; 2 of the units are in Support</i>	
Computer literacy (F.1.)* see Major Courses	
Total.....	57
<i>A minimum of 75 units is required; 18 of the units are in Major and Support</i>	

ELECTIVES	0
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209

COMPUTER SCIENCE DEPARTMENT

**Computer Science Advising Center,
Engineering East Bldg. (20), Room 215
(805) 756-1461**

Faculty

Department Chair, James L. Beug

Emile E. Attala	Elmo A. Keller
Raymond E. Boche	Sham S. Luthra
Lois H. Brady	Leonard D. Myers
W. Chris Buckalew	S. Ronald Oliver
Laurian M. Chirica	Cornel K. Pokorny
John B. Connely	Clinton A. Staley
Charles H. Dana	Daniel J. Stearns
Gene Fisher	Daniel F. Stubbs
Joseph E. Grimes	Patrick O. Wheatley
John Y. Hsu	

Programs

B.S. Computer Science

B.S. Computer Engineering

M.S. Computer Science

Computer Science Minor

The department offers a program leading to the Bachelor of Science degree in Computer Science, a graduate program leading to a Master of Science degree in Computer Science, and a minor in Computer Science.

The undergraduate program provides an in-depth study of computer science fundamentals and practice. This material includes programming, operating systems, computer architecture, languages and translators, database systems, telecommunications, and software engineering. The undergraduate program is accredited by the Computing Sciences Accreditation Board.

Adequate numbers of elective units are provided so that students can specialize in various aspects of computation and its applications. Typical areas of emphasis are artificial intelligence, computer graphics, computer systems, scientific computation, business computation, computer hardware and computer simulation.

Practice is emphasized in addition to the study of theory and concepts. The curriculum is project-oriented and is designed to develop an ability to solve problems through efficient utilization of modern computer concepts. Students can expect to complete many assigned projects on a variety of computer systems and in a variety of programming languages. Students completing the course of study are well

prepared to become practicing computer scientists. They are also well prepared for graduate study. During their last year of study, undergraduate students must complete a significant project experience through enrollment in the senior project, a two-quarter course. The project may be done either as an individual or as a member of a team.

Graduates of the computer science program are sought by the computer industry for positions as systems engineers, applications programmers, program analysts and sales representatives.

A wide variety of computing equipment is available on campus. Lower division courses are usually conducted using the equipment of the university's Academic Computing Services. These central campus resources consist of several mainframe and mini-computers in a time-sharing environment as well as workstations, and a variety of micro-computers. Upper division courses are usually conducted using the facilities of the department's Computer Systems Laboratory. This laboratory, administered by the Computer Science Department, has a variety of advanced workstations, mini- and micro-computers, and a parallel computer. It also houses a graphics laboratory and several research systems which provide an environment suitable for advanced studies.

The department has active student chapters of the Association for Computing Machinery, and Upsilon Pi Epsilon (computer science honor society).

COMPUTER ENGINEERING

For information regarding this program, please refer to Computer Engineering. This program is jointly administered by the Computer Science Department and the Electronic and Electrical Engineering Department.

² As an alternative to MATH 206, students may select MATH 241 and MATH 242 thereby decreasing free electives by 4 units.

B.S. COMPUTER SCIENCE

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements.

	Units
CSC 118 Fundamentals of Computer Science I (F.1.)*	4
CSC 215 Computer Architecture I.....	4
CSC 218 Fundamentals of Computer Science II.....	3
CSC 240 Programming Environments I	3
CSC 245 Discrete Structures	3
CPE 315 Computer Architecture II	4
CSC 332 Numerical Analysis I or CSC 349 Theory and Analysis of Algorithms	3
CSC 345 Data Structures.....	3
CSC 346 File Structures	3
CSC 347 Introduction to Database Systems	4
CSC 351 Programming Languages I: Design	3
CSC 404 Computer Networks	4
CSC 440 Software Engineering I	3
CSC 441 Software Engineering II	3
CSC 445 Theory of Computing I.....	3
CSC 450 Programming Languages II: Description and Analysis.....	4
CSC 451 Programming Languages III: Compiler Implementation.....	4
CSC 453 Introduction to Operating Systems	4
CSC 461 Senior Project	2
CSC 462 Senior Project	3
CSC 463 Undergraduate Seminar	2
EE 219 Logic and Switching Circuits	3
EE 259 Logic and Switching Circuits Laboratory	1
Adviser approved technical electives	12
	<hr/> 85

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

CHEM 124 General Chemistry	4
MATH 141 Calculus I.....	4
MATH 142 Calculus II (B.2.)*	4
MATH 143 Calculus III	4
¹ MATH 206 Linear Algebra I	4
PHYS 131 General Physics (B.1.a.)*	4
PHYS 132 General Physics.....	4
PHYS 133 General Physics (B.1.a.)*	4
STAT 321, STAT 322 Statistical Analysis I, II (B.2.)* .	3,4

39
GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Major and Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/218 (A.4.)	
Area B:	2
A minimum of 18 units is required; 16 of the units are in Support	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)	
BIO 220 recommended for B.1.b. and E.2.	
Mathematics/statistics* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
BIO 220 recommended for E.2. and B.1.b.	
Area F.....	0
A minimum of 2 units is required; 2 of the units are in Major	
Computer literacy (F.1.)* see Major Courses	
Total	<hr/> 57
A minimum of 75 units is required; 18 of the units are in Major and Support	

ELECTIVES	11
	<hr/> 192

¹ As an alternative to MATH 206, students may select MATH 241 and MATH 242 thereby decreasing free electives by 4 units.

CURRICULUM FOR COMPUTER SCIENCE MINOR

Nearly all disciplines need to integrate and utilize the capabilities of computers. The computer science minor consists of a core of 13 to 14 units and the choice of a track for specialized study. The core is to provide the common knowledge and skills that all need who wish to advance further in computer science. The track consists of several required courses and several restricted elective courses.

	<i>Units</i>
Required courses	13-14
CSC 118 Fundamentals of Computer Science I (4)	
CSC 215 Computer Architecture I (4) or	
CSC 240 Programming Environments I (3)	
CSC 218 Fundamentals of Computer Science II (3)	
CSC 345 Data Structures (3).	
(recommended prerequisite: MATH 124 or	
CSC 245)	

Tracks (select one)..... 11-12

Database and Application Development (11)
CSC 347 Introduction to Database Systems (4)
CSC 440 Software Engineering I (3)
Upper-division restricted electives (4)

Computer Architecture (12)
EE 219 Logic and Switching Circuits (3)
EE 259 Logic and Switching Circuits Laboratory (1)
CPE 315 Computer Architecture II (4)
CPE 316 Computer Architecture III (4)

Numerical Applications (11)
CSC 332 Numerical Analysis I (3)
CSC 333 Numerical Analysis II (3)
Upper-division restricted electives (5)

Analysis and Simulation of Systems (11)
CSC 350 Discrete Dynamic Systems (3)
CSC 360 Continuous Dynamic Systems (3)
Upper-division restricted electives (5)

Artificial Intelligence (11)
CSC 420 Artificial Intelligence (4)
CSC 421 Knowledge Based Systems (4)
Upper-division restricted electives (3)

Graphics (12)
CSC 455 Computer Graphics I (4)
Upper-division restricted electives (8)

MASTER OF SCIENCE IN COMPUTER SCIENCE

The M.S. program in Computer Science offers students the opportunity to prepare for careers in several areas of specialization including: computer graphics, computer architecture, operating systems, programming languages, database systems, AI/expert systems, computer communication networks, modeling and simulation. The program is designed for maximum flexibility to allow the student to concentrate in one or more areas of study.

The department has a Computer Systems Laboratory (CSL) to provide a variety of computing resources for instructional and research purposes. The CSL has a SUN workstation cluster, a Hewlett Packard workstation cluster, a logic development lab, a distributed systems lab, a Sequent Balance 8000 multiprocessor system for parallel programming, and several graphics workstations, personal computers, and terminals. The University's Academic Computing Services also provides a variety of microcomputer, workstation, and mainframe computing resources available to students.

Admission to the program requires a baccalaureate degree from an accredited institution and good standing at the last college attended. During the last 90 quarter hours of study, the student must have earned a minimum grade point average of 3.0 if the undergraduate degree is in Computer Science, or 3.25 for other degrees. The Graduate Record Exam (GRE) is required, with a minimum combined score of 1650 (verbal, quantitative, and analytical), and a minimum of 400 on verbal. Foreign applicants must have a minimum score of 550 on the TOEFL and 4.5 on the TWE. Women and underrepresented minorities are strongly encouraged to apply for admission.

Qualified students who do not have an undergraduate degree in Computer Science may be admitted as unclassified students. Unclassified students must complete the necessary undergraduate coursework to be admitted to candidacy. While fulfilling the undergraduate requirements, unclassified students retain official status as graduate students in the University.

Unclassified students may advance to candidacy by completing each of the following undergraduate courses with a "B" or better. These courses do not count toward the graduate degree:

- CPE 315 Computer Architecture II (4)
- CSC 345 Data Structures (3)
- CSC 346 File Structures (3)
- CSC 440 Software Engineering I (3)
- CSC 445 Theory of Computation I (3)
- CSC 453 Introduction to Operating Systems (4)

The department offers several graduate teaching assistantships. Preference is given to continuing graduate students and experienced teachers. Other grant, fellowship, scholarship and loan information can be obtained from the Financial Aid office.

Degree Requirements

The students must file a formal study plan with the Computer Science Department office no later than the end of the quarter in which they complete the first unit of coursework to be counted toward the degree. The formal study plan identifies specific courses to be taken to fulfill requirements of the M.S. degree. The formal study plan may be amended with approval of the graduate coordinator.

The M.S. degree requires at least 45 units beyond the undergraduate degree. Courses must be chosen according to the following requirements:

CURRICULUM FOR M.S. COMPUTER SCIENCE

	<i>Units</i>
Core sequence of required courses:	15
CSC 501 Language and Translators (4)	
CSC 502 Database Systems (4)	
CSC 503 Operating Systems (4)	
CSC 590 Graduate Seminar (3)	
Select two courses from the following:	7-8
CSC 504, 505, 506, 507, 517, 570	
Thesis or project	6
CSC 599 Thesis/Project (2-3) (2-3)	
Electives to be selected with adviser's approval	17-16
	<hr/> 45

For further information or advisement students should communicate with the Graduate Coordinator of the Computer Science Department.

ELECTRONIC AND ELECTRICAL ENGINEERING DEPARTMENT

College of Engineering Advising Center,
Computer Science Building (14), Room 240
(805) 756-1461

Faculty

Department Chair, Saul Goldberg

Samuel O. Agbo	Ahmad Nafisi
Jerome R. Breitenbach	Mahmood Nahvi
Michael M. Cirovic	Ali O. Shaban
Samir K. Datta	Cheng Sun
Eugene D. Fabricius	Shyama C. Tandon
James G. Harris	James H. W. Tseng
William F. Horton	Gustav N. Wassel
Martin E. Kaliski	Donley J. Winger
C. Arthur MacCarley	Michael T. Wollman
Wayne E. McMorran	Chuan-Sung Yeh
Shien-Yi Meng	

Programs

B.S. Electrical Engineering

B.S. Computer Engineering

M.S. Electrical Engineering

The department offers the B.S. program in Electrical Engineering which is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, and the M.S. in Electrical Engineering.

The main objective of the department is to prepare the student for engineering; i.e., pursuing solutions to urgent problems in reshaping the environment to meet human needs while being responsibly aware of all implications. The curriculum provides a sound theoretical background along with current, practical engineering knowledge. The student begins the major in the first quarter with orientation and generally has one or more major courses each quarter until graduation. The many laboratory courses provide practical experience and lead logically into design which begins in the third year.

During their junior and senior years, students choose a block of courses in either Electronics (EL) or Power (EE). The Electronics (EL) block of courses deals with the development, design and application of circuits, devices and systems for communication, computers, controls, information processing and display, and system instrumentation. Senior elective courses in this area provide specialized preparation in a selected area such as active and passive network synthesis, advanced communications systems, computer system design, microelectronic circuit engineering, microprocessor systems applications, microwave engineering, electro-optics, and

solid state devices. The Power (EE) block of courses deals with industrial process control systems and with generation, distribution, control and utilization of electric power. Senior elective courses in this area provide specialized preparation in a selected area such as advanced control systems, energy conversion, power system analysis, protection and stability and solid state motor control.

With adviser approval, senior students select specialized technical courses which make them more attractive to industry as early contributors. The student wishing to pursue graduate work may select appropriate senior courses in keeping with this goal. In the required senior design project, students demonstrate their understanding of engineering knowledge and their ability to apply that knowledge creatively to practical problems.

There are appropriate laboratories equipped to support the program. They provide not only hands-on instrumentation experience, but also design experience. Involvement in faculty research is possible for outstanding students. Research areas include computer-aided education, advanced electronics for automotive and transportation applications, signal and image processing, electric vehicles, computer architecture and software systems, electro-optics, and electric power quality.

The Electric Power Institute, sponsored by the university and underwritten by major utility companies and electrical equipment manufacturers, offers advanced seminars and lectures in the electrical power field and provides limited student and faculty exchange opportunities.

Students are encouraged to participate in appropriate professional clubs such as: Eta Kappa Nu, Amateur Radio Club, Audio Engineering Society, the Electronic and Electrical Engineering Council, the Student Branch of the Institute of Electrical and Electronics Engineers (IEEE), International Society of Hybrid Microelectronics (ISHM), Society of Photo-Optical Instrumentation Engineers (SPIE), Poly Phase Club, and Power Engineering Society.

The Department supports the concept of international education and encourages students to investigate opportunities for overseas study. For further information, see the Study Abroad programs.

COMPUTER ENGINEERING

For information regarding this program, please refer to Computer Engineering. This program is jointly offered by the Computer Science Department and the Electronic and Electrical Engineering Department.

B.S. ELECTRICAL ENGINEERING

Indented courses to be taken in sequence. For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser. Courses are displayed by year.

	Units
Freshman	
EE 110 Orientation	1
EE 112 Electric Circuit Analysis I	2
IME 157 Electronic Manufacturing	3
ANT 201/GEOG 150/SOC 105 (D.4.a.)	3
CHEM 124 General Chemistry (B.1.a.)	4
CHEM 125 General Chemistry	4
CSC 204 C and UNIX (F.1.)	3
ENGL 114 Writing: Exposition (A.1.)	4
ENGL 125/PHIL 125/SPC 125 Critical Thinking (A.2.)	3
ENGL 215 Writing: Argumentation or	
ENGL 218 Professional Writing: Argumentation	
and Reports (A.4.)	4
MATH 141 Calculus I (B.2.)	4
MATH 142 Calculus II (B.2.)	4
MATH 143 Calculus III	4
PHYS 131 General Physics (B.1.a.)	4
PHYS 133 General Physics	4
SPC 201 Public Speaking or	
SPC 202 Princ. of Speech Communication (A.3) ...	3
	<hr/> 54
Sophomore	
EE 211, 241 Electric Circuit Analysis and Lab II	3,1
EE 212, Electric Circuit Analysis and Lab III	3,1
EE 208, 248 Electronic Devices and Lab	3,1
EE 219, 259 Logic and Switching Circuits, and Lab ..	3,1
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
MATH 317 Topics in Engineering Math	4
ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
PHYS 132 General Physics	4
PHYS 211 Modern Physics	4
ECON 201/ECON 211/ECON 222 (D.3.)	3
PHIL 230/PHIL 231 Philosophical Classics (C.1.)	3
PSY 201/PSY 202 General Psychology (E.1.)	3
	<hr/> 51
Junior	
EE 301, 341 Linear Systems Analysis and Lab	3,1
EE 302, 342 Linear Control Systems and Lab	3,1
EE 304 Random Signals and Noise	3
EE 307, 347 Digital Integrated Electronics and Lab ...	3,1
EE 308, 348 Electronic Circuits and Lab	3,1
EE 309, 349 Integrated Electronic Circuits, Lab..	3,1
EE 319 Digital System Design	3
EE 325, 365 Energy Conversion Electromagnetics, La	3,1

EE 328 Discrete Time Systems	3
EE 334 Electromagnetic Fields I	3
EE 359 Digital System Design Laboratory	1
MATE 206 Materials Engineering	3
BIO 220 Physiology and Biological Adaptation	
(B.1.b., E.2.)	4
HIST 204 History of American Ideals and	
Institutions (D.1.)	3
¹ Fine and performing arts elective (C.2.)	3
² Electronic or Power restricted technical elective	3
	<hr/> 53
Senior	
EE 461 Senior Project	3
EE 462 Senior Project	2
EE 463 Undergraduate Seminar	1
ME 302 Thermodynamics	3
HIST 315 Modern World History (D.2.)	3
POLS 210 American and California Govt. (D.1.)	3
¹ ANT/BUS/ECON/GEOG/POLS/SOC/WS elective	
(300-400 level) (D.4.b.)	3
¹ Arts and humanities elective (Area C)	3
¹ Critical reading electives (C.1.)	6
¹ Literature, philosophy, arts elective	
(300-400 level) (C.3.)	3
² Electronic or Power restricted technical electives	7
³ Approved technical electives	13
	<hr/> 50
	<hr/> 208

¹ To be selected in accordance with the General Education-Breadth requirements. (Please see page 77 of this catalog.)

² Select one block of courses, either EL or EE.:
Electronic (EL) Block: EE 313, EE 353, EE 401, EE 414
Power (EE) Block: EE 303, EE 406, ME 341

³ A minimum of two senior design labs with EE prefix and two design lecture courses in the major is required. To be approved by major adviser.

B.S. ELECTRICAL ENGINEERING

Courses are displayed by Major, Support and General Education and Breadth.

MAJOR COURSES

	Units
EE 110 Orientation	1
EE 112 Electric Circuit Analysis I	2
EE 208, 248 Electronic Devices and Lab.....	3,1
EE 211, 241 Electric Circuit Analysis and Lab II	3,1
EE 212, 242 Electric Circuit Analysis and Lab III.....	3,1
EE 219, 259 Logic and Switching Circuits and Lab ...	3,1
EE 301, 341 Linear Systems Analysis and Lab.....	3,1
EE 302, 342 Linear Control Systems and Lab.....	3,1
EE 304 Random Signals and Noise	3
EE 307, 347 Digital Integrated Electronics and Lab ...	3,1
EE 308, 348 Electronic Circuits and Lab	3,1
EE 309, 349 Integrated Electronic Circuits and Lab ...	3,1
EE 319, 359 Digital System Design and Lab	3,1
EE 325, 365 Energy Conversion Electromagnetics and Lab.....	3,1
EE 328 Discrete Time Systems	3
EE 334 Electromagnetic Fields I.....	3
EE 461 Senior Project.....	3
EE 462 Senior Project.....	2
EE 463 Undergraduate Seminar.....	1
PHYS 133 General Physics.....	4
Electronic or Power restricted technical electives	10
Select one block of courses, either EL or EE.	
<i>Electronic (EL) Block</i>	
EE 313, 353 Signal Transmission and Lab (3,1)	
EE 401 Electromagnetic Fields II (3)	
EE 414 Intro. to Communication Systems (3)	
<i>Power (EE) Block</i>	
EE 303 Power Transmission (3)	
EE 406 Power System Analysis I (4)	
ME 341 Fluid Mechanics (3)	
Adviser approved technical electives	13
Select a minimum of 2 senior design laboratories and 2 design with approval by major adviser.	
	<hr/> 89

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

CHEM 124 General Chemistry (B.1.a.)*	4
CHEM 125 General Chemistry	4
CSC 204 C and UNIX (F.1.)*	3
IME 157 Electronic Manufacturing	3
MATE 206 Materials Engineering.....	3
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II (B.2.)*	4
MATH 143 Calculus III.....	4
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
MATH 317 Topics in Engineering Math.....	4

ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
ME 302 Thermodynamics.....	3
PHYS 131 General Physics (B.1.a.)*	4
PHYS 132 General Physics	4
PHYS 211 Modern Physics	4
	<hr/> 62

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/218 (A.4.)	
Area B	2
<i>A minimum of 18 units is required; 16 of the units are in Support</i>	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)	
BIO 220 recommended for B.1.b. and E.2.	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
BIO 220 recommended for E.2. and B.1.b.	
Area F.....	0
<i>A minimum of 2 units is required; 2 of the units are in Support</i>	
Computer literacy (F.1.)* see Support Courses	
Total.....	<hr/> 57
<i>A minimum of 75 units is required; 18 of the units are in Support</i>	

ELECTIVES	0
	<hr/> 208

MASTER OF SCIENCE DEGREE IN ELECTRICAL ENGINEERING

General Characteristics

The Master of Science program in Electrical Engineering has the following objectives:

- Job-entry education for the more complex areas of engineering, such as research and development, innovative design, systems analysis and design, and managerial engineering;
- Updating and upgrading opportunities for practicing engineers;
- Graduate preparation for further study in engineering, leading to the Doctor of Engineering or Ph.D. degree;
- A base which allows graduates to maintain currency in their fields.

Prerequisites

For admission as a classified graduate student, an applicant must hold a bachelor's degree in engineering or a closely related physical science with a minimum grade point average of 3.0 in the last 90 quarter units (60 semester units) attempted. Applicants for graduate engineering programs are required to submit satisfactory scores for the General (Aptitude) Test of the Graduate Record Examination. Foreign applicants must have satisfactory scores on the TOEFL and TWE exams. An applicant who meets these standards but lacks prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies before advancement to classified graduate standing.

Information pertaining to specific requirements for admission to graduate standing (classified or conditionally classified) may be obtained from the Graduate Coordinator, Electronic and Electrical Engineering Department.

Program of Study

Graduate students must file a formal study plan with their adviser, department, college and university graduate studies office by no later than the end of the quarter in which the 12th unit of approved courses is completed. The formal program of study must include a minimum of 45 units (at least 24 of which must be at the 500 level and the remainder at the 400 level) with a specialization in one of the following areas: Computer Engineering, Electrical Engineering, Electronic Engineering.

The broad curriculum requirements for the M.S. in Electrical Engineering are:

- core of 16 units;
- a minimum of 12 units in major 500 level courses;

- the remaining units from a list of approved electives;
- at least 24 units of the 45 unit program at the 500 level.

Two program options are available for M.S. in Electrical Engineering students: a thesis program which requires coursework, a thesis and oral defense of thesis; or a nonthesis option which involves additional coursework and a comprehensive examination. The nonthesis option is normally allowed only for those students who have completed an undergraduate senior project or have had significant engineering project experience.

M.S. Electrical Engineering

	Units
Core Courses	16
EE 525 Stochastic Processes for Engineers (4)	
EE 563 Graduate Seminar (1) (1) (1)	
EE 599 Design Project (Thesis) (2) (2) (5) or 9 units of major field graduate level courses and a comprehensive written examination	
Major field graduate courses	12
¹ To be selected from the following list:	
EE 511 Electric Machine Theory (3)	
EE 513 Control Systems Theory (4)	
EE 514 Digital and Nonlinear Control Systems Theory (4)	
EE 515 Discrete Time Filters (4)	
EE 517 Information Theory (4)	
EE 518 Advanced Power System Analysis (3)	
EE 519 Power System Design (4)	
EE 520 Solar-Photovoltaic Systems Design (3)	
EE 521 Computer Systems (4)	
EE 522 Microprocessor-Based Digital Sys. Des. (4)	
EE 523 Digital Systems Design (3)	
EE 524 Solid State Electronics (3)	
EE 526 Digital Communications (4)	
EE 527 Advanced Topics in Power Electronics (4)	
EE 528 Digital Image Processing (4)	
EE 530 Electro-Optics Systems (4)	
Approved technical electives (400-500 level)	17
May be selected from the course list above and other adviser approved technical electives.	
	45

¹ Not all courses listed are offered each academic year. Consult the EL/EE Department for current information on course offerings.

ENGINEERING SCIENCE

An Interdisciplinary Curriculum in Engineering Science and Emerging Technologies

Coordinator, Daniel W. Walsh
Engineering Bldg. (13), Room 266
(805) 756-2131

College of Engineering Advising Center
Engineering East Bldg. (20), Room 215
(805) 756-1461

Program

B.S. Engineering Science

The Bachelor of Science degree in Engineering Science is designed to allow students the latitude in course selection required to educate themselves either in the classical study of engineering science or in new and evolving interdisciplinary technologies. Also, it is designed for those students who wish to major in engineering but have not presently decided in which specific program their interest is centered. The curriculum builds a sound foundation in the fundamental principles of engineering and engineering systems during the early years of study. During their final quarters of study, students customize their study plan with the help of a faculty adviser and are given the opportunity to focus their education while still at the undergraduate level. A B.S. degree in Engineering Science is, therefore, a direct path to employment in a classic engineering field or in an area of emerging technology. It is also a natural step toward a professional or a graduate degree.

All practitioners of engineering must have an understanding of the physical sciences and mathematics. Further, they must have a firm grasp of engineering sciences. The basic engineering sciences are:

- (1) mechanics of solids and fluids,
- (2) electrical science,
- (3) thermodynamics and statistical mechanics,
- (4) materials science,
- (5) information transmission,
- (6) logic and computing devices,
- (7) systems analysis, and
- (8) transfer and rate processes.

The engineering science curriculum provides the framework for this matrix of understanding, upon which the practitioner may begin to develop a unique area of expertise.

The engineering science program focuses on synthesis, the integration of diverse elements to produce a single entity – an integral activity in the engineering profession. The Synthesis plan of study stresses integrated design, open-ended problem solving, experimentation, and manufacturing and construction. The program emphasizes phenomenological theory as well as analytical, experimental, and design skills – not in compartmentalized courses, but as a unified entity. The curriculum accents societal context, multidisciplinary teamwork and communication skills. It also emphasizes practical applications as well as principles. The laboratories in many of the courses are constantly evolving,

so students benefit from a variety of state-of-the-art equipment.

This program is for directed, highly motivated students. The technical elective courses are selected to be consistent with a sharply defined career goal. Each student will be required to submit a study plan to the coordinator prior to the end of the first quarter of their junior year. Study plans selected in the past have emphasized engineering physics, biomedical engineering, and ocean engineering. Plans that are currently popular include biochemical engineering and synthesis.

B.S. ENGINEERING SCIENCE

Indented courses to be taken in sequence. For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser. Courses are displayed by year.

	Units
Freshman	
ENGR 110 Engineering Science I.....	3
ENGR 111 Engineering Science II.....	3
ENGR 112 Engineering Science III.....	3
BIO 220 Physiology and Biological Adaptation (B.1.b., E.2.)	4
CHEM 124 General Chemistry (B.1.a.)	4
CHEM 125 General Chemistry	4
ENGL 114 Writing: Exposition (A.1.).....	4
ENGL 125/PHIL 125/SPC 125 Critical Thinking (A.2.)	3
MATH 141 Calculus I (B.2.)	4
MATH 142 Calculus II (B.2.)	4
MATH 143 Calculus III	4
PHYS 131 General Physics (B.1.a.).....	4
PHYS 132 General Physics	4
SPC 201 Public Speaking or SPC 202 Principles of Speech Communication (A.3.)	3
	<hr/> 51

Sophomore	
CE 204 Strength of Materials.....	3
EE 201 Electric Circuit Theory.....	3
MATH 241 Calculus IV	4
MATH 242 Differential Equations.....	4
MATH 300–400 level elective.....	4
ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
PHYS 133 General Physics.....	4
Physical science elective	4
ANT 201/GEOG 150/SOC 105 (D.4.a.).....	3
CSC 118 Fundamentals of Computer Science or CSC 204 C and Unix (F.1.)	3
ECON 201 Survey of Economics or ECON 211 Principles of Economics (D.3.)	3
ENGL 218 Professional Writing: Argumentation and Reports (A.4.)	4
HIST 204 History of American Ideals and Institutions (D.1.).....	3
Adviser approved technical electives	4
	<hr/> 52

Junior

IME 314 Engineering Economics.....	3
ME 302 Thermodynamics.....	3
ME 313 Heat Transfer.....	3
MATE 206, 241 Materials Engineering and Lab	3,1
POLS 210 American and California Government (D.1.).....	3
PSY 201/PSY 202 General Psychology (E.1.).....	3
¹ Arts and humanities elective (Area C)	3
¹ Critical reading electives (C.1.).....	6
Adviser approved technical electives	18

46**Senior**

ME 341 Fluid Mechanics.....	3
Senior Project (in appropriate engineering discipline).	2,2
HIST 315 Modern World History (D.2.).....	3
PHIL 230/PHIL 231 Philosophical Classics (C.1.).....	3
¹ ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.).....	3
¹ Fine and performing arts elective (C.2.).....	3
¹ Literature, philosophy, arts elective (300–400 level) (C.3.)	3
Adviser approved technical electives	18
Electives.....	9

49

198

¹ To be selected in accordance with the General Education-Breadth requirements. (Please see page 77 of this catalog.)

B.S. ENGINEERING SCIENCE

Courses are displayed by Major, Support, General Education and Breadth, and Electives. A minimum of 60 units at 300–400 level.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements.

	Units
CE 204 Strength of Materials.....	3
CSC 118 Fundamentals of Computer Science or CSC 204 C and Unix (F.1.)*	3
EE 201 Electric Circuit Theory	3
ENGR 110 Engineering Science I	3
ENGR 111 Engineering Science II	3
ENGR 112 Engineering Science III	3
IME 314 Engineering Economics	3
MATE 206, 241 Materials Engineering and Lab.....	3,1
ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
ME 302 Thermodynamics	3
ME 313 Heat Transfer.....	3
ME 341 Fluid Mechanics	3
Senior Project in appropriate engineering discipline..	2,2
Adviser approved technical electives	40
(at least 11 units must be 300–400 level)	
	<hr/> 84

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

CHEM 124 General Chemistry (B.1.a.)*	4
CHEM 125 General Chemistry	4
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II (B.2.)*	4
MATH 143 Calculus III	4
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
MATH 300–400 level elective	4
PHYS 131 General Physics (B.1.a.)*	4
PHYS 132 General Physics.....	4
PHYS 133 General Physics.....	4
Physical science elective	4
	<hr/> 48

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Major and Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/218 (A.4.) ENGL 218 recommended	
Area B:	2
A minimum of 18 units is required; 16 of the units are in Support	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)	
Mathematics/statistics (B.2.)*see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
BIO 220 recommended for E.2. and B.1.b.	
Area F:	0
A minimum of 2 units is required; 2 of the units are in Support	
Computer literacy (F.1.)* see Major Courses	
Total.....	<hr/> 57
A minimum of 75 units is required; 18 of the units are in Support	
ELECTIVES.....	9

INDUSTRIAL AND MANUFACTURING ENGINEERING DEPARTMENT

Graphic Arts Bldg. (26), Room 100
(805) 756-2342

College of Engineering Advising Center
Engineering East Bldg. (20), Room 215
(805) 756-1461

Faculty

Department Chair, H. Jo Anne Freeman

Sema E. Alptekin	Unny Menon
K. N. Balasubramanian	A. Reza Pouraghabagher
Kenneth L. Brown	Ahmad K. Seifoddini
J. Kent Butler	Richard A. Strahl
Archie D. Cheda	Donald E. White
Mark A. Cooper	Tao H. Yang
Anthony K. Mason	

Programs

B.S. Industrial Engineering

B.S. Manufacturing Engineering

Integrative Technology Minor

The department focuses on programs that integrate engineering with a real concern for people. Our students and faculty study topics that lead to satisfying and productive careers as well as strong preparation for graduate work in many fields. Programs reflect the traditional strengths of Cal Poly through close interaction between students and faculty in classroom, laboratory, and other activities. See the descriptions below for details of the various programs; course descriptions provide an understanding of the breadth and depth of our majors.

Department and university laboratories and computers are integrated into coursework from matriculation until graduation to investigate, test, and apply theoretical principles learned in the classroom.

There are active student chapters of the Institute of Industrial Engineers; Alpha Pi Mu, the national honorary society for industrial engineers; Omega Rho, the national honor society for operations research; APICS, the American Production and Inventory Control Society; SME, the Society of Manufacturing Engineers; AWS, the American Welding Society; and AFS, the American Foundry Society.

INDUSTRIAL ENGINEERING

Industrial Engineering is the profession concerned with solving engineering and management problems by applying scientific logic, systems methodology, and by utilizing information, energy, materials, facilities, and personnel most effectively. Its objective is to improve quality and efficient

production of goods and services and to act as the interface between technology and humans. Engineering methods and practical knowledge are used in formulating decision models for the optimum application of engineering and management principles.

Graduates can choose from a challenging range of career activities: operations research and analysis, production planning and scheduling, plant design, management, human factors engineering design, data processing and analysis, measurement, quality control and reliability assurance, technical economic planning, resource conservation, productivity measurement, increasing productivity using computer integrated manufacturing techniques, robotics, and, in general, systems analysis and design. The physical, engineering, and social sciences form the broad base for these endeavors.

The Bachelor of Science program in Industrial Engineering is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

The program is oriented to provide graduates with the capability of producing results with a minimum of additional training. Health care industries, banks, retail chains, farms, airlines, mines, computer firms, as well as government and traditional manufacturing industries, employ graduates of this discipline. Graduates also are well prepared for successful graduate study.

MANUFACTURING ENGINEERING

Manufacturing engineering is the profession that applies engineering analysis and methods to the production of all manufactured goods and services. The manufacturing engineer works directly with the people, processes, and machines involved in manufacturing operations. Focus is on both development and sustained operation of manufacturing systems, including computer-aided methods, automation, numerical control, production tooling, and material handling, as well as the processes and ancillary support systems of modern manufacturing.

Graduates typically work more directly with the manufacturing processes than do industrial engineers. Emphasis is placed upon application of a basic knowledge of physics and materials. Knowledge of basic processes, tool design, and computer-aided manufacturing are applied directly to the problems of development and sustained operation of manufacturing operations.

The curriculum leading to the Bachelor of Science degree in Manufacturing Engineering is a new program and is not currently accredited. This program was developed with the intention to seek accreditation from the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. Accreditation review is only done following the graduation of the first class of students in a new program. Graduates are prepared for job-entry at the professional level in the areas of CAD/CAM, process engineering, quality assurance, and production engineering. Graduates also are well prepared for successful graduate study.

INTEGRATIVE TECHNOLOGY MINOR

The Integrative Technology minor is an interdisciplinary program jointly sponsored by Industrial and Manufacturing Engineering, Industrial Technology, and Psychology and Human Development departments. The minor is for non-engineering students who wish to pursue their professional career in a corporate setting and want to learn more about the impact of technology. The minor will acquaint students with how factories operate and how technology is integrated into corporate operations. For more information, see the Industrial Technology Department.

GRADUATE PROGRAMS

Cal Poly offers a Master of Science degree in Engineering with a specialization in Industrial Engineering, and also a joint MS/MBA Engineering with a specialization in Engineering Management. Please refer to the M.S. Engineering section of the College of Engineering or the MBA section of the College of Business.

B.S. INDUSTRIAL ENGINEERING

Indented courses to be taken in sequence.

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser. Courses are displayed by year.

	Units
Freshman	
IME 101 Introduction to Industrial and Manufacturing Engineering	1
IME 141 Manufacturing Processes: Net Shape	1
IME 223 Work Design and Measurement	4
IME 143 Manufacturing Processes: Material Removal	2
ETME 142 Engineering Drawing I	1
ETME 143 Engineering Drawing II	1
ANT 201/GEOG 150/SOC 105 (D.4.a.)	3
BIO 220 Physiology and Biological Adaptation (B.1.b., E.2.)	4
CHEM 124 General Chemistry (B.1.a.)	4
CHEM 125 General Chemistry	4
CSC 204 C and UNIX (F.1.)	3
ENGL 114 Writing: Exposition (A.1.)	4
ENGL 125/PHIL 125/SPC 125 Critical Thinking (A.2.)	3
ENGL 218 Professional Writing: Argumentation and Reports (A.4.)	4
MATH 141 Calculus I (B.2.)	4
MATH 142 Calculus II	4
MATH 143 Calculus III	4
PSY 201/PSY 202 General Psychology (E.1.)	3
	<hr/> 54
Sophomore	
IME 239 Industrial Costs and Controls	3
IME 251 Manufacturing Engineering Analysis	3
IME 314 Engineering Economics	3
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
ECON 201/ECON 211/ECON 222 (D.3.)	3
HIST 204 History of American Ideals and Institutions (D.1.)	3
PHYS 131 General Physics (B.1.a.)	4
PHYS 132 General Physics	4
PHYS 133 General Physics	4
POLS 210 American and California Govt. (D.1.)	3
SPC 201 Public Speaking or	
SPC 202 Principles of Speech Communication (A.3.)	3
¹ Critical reading elective (C.1.)	3
	<hr/> 50

Junior

IME 301 Operations Research I	4
IME 305 Operations Research II	4
IME 312 Data Management and System Design	3
IME 319 Human Factors Engineering	3
IME 335 Computer-Aided Manufacturing I	4
IME 421 Manufacturing Organization	3
IME 426 Engineering Test Design and Analysis	4
CE 204 Strength of Materials or	
ME 341 Fluid Mechanics	3
EE 201 Electric Circuits Theory	3
EE 321 Electronics	3
MATE 206 Materials Engineering or	
ME 302 Thermodynamics	3
PHIL 230/PHIL 231 Philosophical Classics (C.1.)	3
STAT 321 Statistical Analysis I (B.2.)	3
² Adviser approved technical electives which must meet EAC-ABET requirements	10
	<hr/> 53

Senior

IME 410 Inventory Control Systems	4
IME 420 Simulation and Expert Systems	4
IME 429 Ergonomics Lab	1
IME 430 Quality Engineering	4
IME 441, 442 Engineering Supervision I, II	1,1
IME 443 Facilities Planning and Design	4
IME 461 Senior Project	2
IME 462 Senior Project	3
IME 463 Undergraduate Seminar	2
HIST 315 Modern World History (D.2.)	3
¹ ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)	3
¹ Arts and humanities elective (Area C)	3
¹ Critical reading elective (C.1.)	3
¹ Fine and performing arts elective (C.2.)	3
¹ Literature, philosophy, arts elective (300-400 level) (C.3.)	3
² Adviser approved technical electives which must meet EAC-ABET requirements	9
	<hr/> 53
	<hr/> 210

¹ To be selected in accordance with the General Education-Breadth and A.B.E.T. requirements. (Please see page 77 of this catalog.)

² Adviser approved technical electives which must meet EAC-ABET requirements: (IME 303, 356, 407, 408, 409, 411, 413, 416, 418, 433, 435, 437, 455, 456; CSC 420; MATH 306; PSY 494; or current listing)

B.S. INDUSTRIAL ENGINEERING

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

MAJOR COURSES

	Units
IME 101 Intro. to Industrial and Manufacturing Engineering	1
IME 141 Manufacturing Processes: Net Shape	1
IME 143 Manufacturing Processes: Material Removal	2
IME 223 Work Design and Measurement	4
IME 239 Industrial Costs and Controls	3
IME 251 Manufacturing Engineering Analysis	3
IME 301 Operations Research I	4
IME 305 Operations Research II	4
IME 312 Data Management and System Design	3
IME 314 Engineering Economics	3
IME 319 Human Factors Engineering	3
IME 335 Computer-Aided Manufacturing I	4
IME 410 Inventory Control Systems	4
IME 420 Simulation and Expert Systems	4
IME 421 Manufacturing Organization	3
IME 426 Engineering Test Design and Analysis	4
IME 429 Ergonomics Lab	1
IME 430 Quality Engineering	4
IME 441, 442 Engineering Supervision I, II	1, 1
IME 443 Facilities Planning and Design	4
IME 461 Senior Project	2
IME 462 Senior Project	3
IME 463 Undergraduate Seminar	2
Adviser approved technical electives which must meet EAC-ABET requirements: (IME 303, 356, 407, 408, 409, 411, 413, 416, 418, 433, 435, 437, 455, 456; CSC 420; MATH 306; PSY 494 or current listing)	19
	<hr/> 87

SUPPORT COURSES

* = Courses satisfy General Education and Breadth.

CE 204 Strength of Materials or ME 341 Fluid Mechanics	3
CHEM 124 General Chemistry (B.1.a.)*	4
CHEM 125 General Chemistry	4
CSC 204 C and UNIX (F.1.)*	3
EE 201 Electric Circuits Theory	3
EE 321 Electronics	3
ETME 142 Engineering Drawing I	1
ETME 143 Engineering Drawing II	1
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II	4
MATH 143 Calculus III	4
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3

ME 302 Thermodynamics or MATE 206 Materials Engineering	3
PHYS 131 General Physics (B.1.a.)*	4
PHYS 132 General Physics	4
PHYS 133 General Physics	4
STAT 321 Statistical Analysis I (B.2.)*	3

66

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.) ENGL 218 recommended	
Area B:	2
A minimum of 18 units is required; 16 of the units are in Support	
Physical Science (B.1.a.)* see Support Courses	
Life science (B.1.b.)	
BIO 220 recommended for B.1.b. and E.2.	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
BIO 220 recommended for E.2. and B.1.b.	
Area F:	0
A minimum of 2 units is required; 2 of the units are in Support	
Computer literacy (F.1.)* see Support Courses	
Total	<hr/> 57
A minimum of 75 units is required; 18 of the units are in Support	
ELECTIVES	0

210

B.S. MANUFACTURING ENGINEERING

Indented courses to be taken in sequence.

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser. Courses are displayed by year.

	Units
Freshman	
IME 101 Introduction to Industrial and Manufacturing Engineering	1
IME 141 Manufacturing Processes: Net Shape	1
IME 223 Work Design and Measurement.....	4
IME 142 Manufacturing Processes: Materials Joining	2
IME 143 Manufacturing Processes: Material Removal	2
ETME 141 Descriptive Geometry.....	2
ETME 142 Engineering Drawing I	1
ETME 143 Engineering Drawing II	1
ANT 201/GEOG 150/SOC 105 (D.4.a.)	3
CHEM 124 General Chemistry (B.1.a.)	4
CHEM 125 General Chemistry.....	4
CSC 204 C and UNIX (F.1.).....	3
ENGL 114 Writing: Exposition (A.1.).....	4
ENGL 125/PHIL 125/SPC 125 Critical Thinking (A.2.)	3
MATH 141 Calculus I (B.2.)	4
MATH 142 Calculus II	4
MATH 143 Calculus III	4
PHYS 131 General Physics (B.1.a.).....	4
SPC 201 Public Speaking or	
SPC 202 Principles of Speech Communication (A.3.)	3
	<hr/> 54
Sophomore	
IME 239 Industrial Costs and Controls	3
IME 241 Process Design I.....	1
IME 251 Manufacturing Engineering Analysis	3
CE 204 Strength of Materials.....	3
MATE 206 Materials Engineering	3
MATE 241 Materials Engineering Lab	1
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
ECON 201/ECON 211/ECON 222 (D.3.)	3
ENGL 218 Professional Writing: Argumentation and Reports (A.4.)	4
PHYS 132 General Physics.....	4
PHYS 133 General Physics	4
STAT 321 Statistical Analysis I (B.2.)	3
² Adviser approved technical electives which must meet EAC-ABET requirements	8
	<hr/> 54

Junior

IME 314 Engineering Economics	3
IME 335 Computer-Aided Manufacturing I.....	4
IME 341 Tool Engineering I.....	4
IME 342 Manufacturing Systems Integration.....	3
IME 356 Manufacturing Automation	4
CE 205, 206 Strength of Materials and Lab or	
ME 341 Fluid Mechanics	3
EE 201 Electric Circuits Theory	3
EE 251 Electric Circuits Lab	1
EE 321 Electronics.....	3
ME 302 Thermodynamics.....	3
ME 313 Heat Transfer.....	3
BIO 220 Physiology and Biological Adaptation (B.1.b., E.2.).....	4
HIST 204 History of American Ideals and Institutions (D.1.).....	3
POLS 210 American and California Govt. (D.1.).....	3
¹ Critical reading elective (C.1.)	3
² Adviser approved technical electives which must meet EAC-ABET requirements.....	4
	<hr/> 51

Senior

IME 418 Product-Process Design	4
IME 421 Manufacturing Organization	3
IME 426 Engineering Test Design and Analysis.....	4
IME 430 Quality Engineering	4
IME 455 Manufacturing Design and Implementation	3
IME 461 Senior Project	2
IME 462 Senior Project	3
IME 463 Undergraduate Seminar	2
HIST 315 Modern World History (D.2.).....	3
PHIL 230/PHIL 231 Philosophical Classics (C.1.).....	3
PSY 201/PSY 202 General Psychology (E.1.).....	3
¹ ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.) (BUS 404 recommended)...	3
¹ Arts and humanities elective (Area C)	3
¹ Critical reading elective (C.1.)	3
¹ Fine and performing arts elective (C.2.)	3
¹ Literature, philosophy, arts elective (300-400 level) (C.3.) (PHIL 337 or HUM 402 recommended)	3
	<hr/> 49
	<hr/> 208

¹ To be selected in accordance with the General Education-Breadth and A.B.E.T. requirements. (Please see page 77 of this catalog.)

² Adviser approved technical electives which must meet EAC-ABET requirements: IME 242, 243, 301, 319, 336, 357, 361, 362, 363, 408, 410, 411, 429, 443, 456 or current listing

B.S. MANUFACTURING ENGINEERING

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

IME 101 Introduction to Industrial and Manufacturing Engineering	1
IME 141 Manufacturing Processes: Net Shape	1
IME 142 Manufacturing Processes: Materials Joining	2
IME 143 Manufacturing Processes: Material Removal	2
IME 223 Work Design and Measurement	4
IME 239 Industrial Costs and Controls	3
IME 241 Process Design I	1
IME 251 Manufacturing Engineering Analysis	3
IME 314 Engineering Economics	3
IME 335 Computer-Aided Manufacturing I	4
IME 341 Tool Engineering I	4
IME 342 Manufacturing Systems Integration	3
IME 356 Manufacturing Automation	4
IME 418 Product-Process Design	4
IME 421 Manufacturing Organization	3
IME 426 Engineering Test Design and Analysis	4
IME 430 Quality Engineering	4
IME 455 Manufacturing Design and Implementation I	3
IME 461 Senior Project	2
IME 462 Senior Project	3
IME 463 Undergraduate Seminar	2
Adviser approved technical electives which must meet EAC-ABET requirements: IME 242, 243, 301, 319, 336, 357, 361, 362, 363, 408, 410, 411, 429, 443, 456 or current listing	12
	<hr/> 72

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

CE 204 Strength of Materials	3
CE 205, 206 Strength of Materials and Lab or ME 341 Fluid Mechanics	3
CHEM 124 General Chemistry (B.1.a.)*	4
CHEM 125 General Chemistry	4
CSC 204 C and UNIX (F.1.)*	3
EE 201 Electric Circuits Theory	3
EE 251 Electric Circuits Lab	1
EE 321 Electronics	3
ETME 141 Descriptive Geometry	2
ETME 142 Engineering Drawing I	1
ETME 143 Engineering Drawing II	1
MATE 206 Materials Engineering	3
MATE 241 Materials Engineering Lab	1
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II	4
MATH 143 Calculus III	4
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
ME 302 Thermodynamics	3

ME 313 Heat Transfer	3
PHYS 131 General Physics (B.1.a.)*	4
PHYS 132 General Physics (B.1.a.)*	4
PHYS 133 General Physics	4
STAT 321 Statistical Analysis I (B.2.)*	3
	<hr/> 79

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 9 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.) ENGL 218 recommended	
Area B:	2
A minimum of 18 units is required; 16 of the units are in Support	
Physical Science (B.1.a.)* see Support Courses	
Life science (B.1.b.)	
BIO 220 recommended for B.1.b. and E.2.	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.) PHIL 337/HUM 402 recommended.	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.) BUS 404 recommended.	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
BIO 220 recommended for E.2. and B.1.b.	
Area F:	0
A minimum of 2 units is required; 2 of the units are in Support	
Computer literacy (F.1.)* see Support Courses	
Total	<hr/> 57
A minimum of 75 units is required; 18 of the units are in Support	
ELECTIVES	0
	<hr/> 208

MATERIALS ENGINEERING DEPARTMENT

Air Conditioning Engineering Bldg. (12), Room 107-H
(805) 756-2568
FAX: (805) 756-2299

Faculty

Department Head, Robert H. Heidersbach, Jr.

William D. Forgeng	Paul E. Rainey
Blair London	Linda S. Vanasupa
Anny Morrobel-Sosa	Daniel W. Walsh

also actively sought by graduate programs throughout the country.

Materials engineering students participate in a variety of professional societies on campus. They are especially active in the Student Chapters of Society for the Advancement of Material and Process Engineering and ASM International (formerly American Society for Metals).

Program

B.S. Materials Engineering

Materials engineers deal with materials spanning the spectrum from steels for large bridges, buildings, pipelines and similar structures to the ultralight, high-strength materials used in modern aerospace applications. Increasing numbers of materials engineers find employment in research related to ultrapure electronic materials and components. Materials engineers are heavily involved in the advances being made with high-temperature, superconducting ceramics.

Because virtually all engineering designs are limited by the availability and cost of materials, materials engineers work closely with all other engineering disciplines. They use knowledge of science, engineering, and state-of-the-art analytical instruments to make recommendations on virtually all major engineering designs. The ability to communicate with a wide variety of people with differing backgrounds is very important to the successful practice of materials engineering.

Materials engineers find employment in many industries offering a number of challenging career opportunities. Many graduates are employed in the aerospace, electronic, chemical and petroleum industries. Some work as consultants for large or small organizations. Others become executives in industries ranging from defense contracting to biomedical-device manufacturing. A significant number of materials engineers are involved in research; many technological advances are limited by materials, and new materials are needed for virtually all evolving technologies.

The curriculum in materials engineering emphasizes practical applications as well as principles. The laboratories are constantly evolving, and our students benefit from frequent exposure to a wide variety of materials testing and analysis equipment. The program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. Our students have a reputation for being immediately productive in industry, and they are

B.S. MATERIALS ENGINEERING

Indented courses to be taken in sequence. For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser. Courses are displayed by year.

	Units		
Freshman			
MATE 121 Introduction to Materials Engineering	1	MATE 403 Materials Inspection	3
MATE 122 Introduction to Materials Engineering Analysis	1	MATE 404 Failure Analysis	3
¹ ETME 142 Engineering Drawing I	1	MATE 427 Composites	3
ANT 201/GEOG 150/SOC 105 (D.4.a.)	3	MATE 428 Polymers	3
CHEM 124 General Chemistry (B.1.a.)	4	MATE 429 Instrumental Analysis	3
CHEM 125 General Chemistry	4	ME 212 Engineering Dynamics	3
MATH 141 Calculus I (B.2.)	4	⁴ CE 205, 206 Strength of Materials and Lab	2,1
MATH 142 Calculus II (B.2.)	4	⁴ EE 201, 251 Electric Circuits Theory and Lab	3,1
MATH 143 Calculus III	4	⁶ IME 314 Engineering Economics	3
ENGL 114 Writing: Exposition (A.1.)	4	ME 313 Heat Transfer	3
ENGL 125/PHIL 125/SPC 125 Critical Thinking (A.2.)	3	CHEM 305 Physical Chemistry	3
HIST 204 History of American Ideals and Institutions (D.1.)	3	CHEM 306 Physical Chemistry	3
PHYS 131 General Physics (B.1.a.)	4	HIST 315 Modern World History (D.2.)	3
POLS 210 American and California Government (D.1.)	3	² Critical reading elective (C.1.)	3
PSY 201/PSY 202 General Psychology (E.1.)	3		52
² Fine and performing arts elective (C.2.)	3	Senior	
³ Manufacturing processes electives	2,2	MATE 421 Materials Thermodynamics I	3
	53	MATE 422 Materials Thermodynamics II	3
Sophomore		MATE 424 Ceramic Materials	3
⁴ MATE 206, 241 Materials Engineering and Lab	3,1	MATE 425 Corrosion Engineering	4
MATE 224 Metallography	3	MATE 426 Fracture of Materials	3
⁴ MATE 226, 246 Physical Metallurgy and Lab	4,2	MATE 430 Microelectronics Materials Processing	3
CE 204 Strength of Materials	3	MATE 441 Advanced Materials Laboratory I	1
⁵ CSC 251 Digital Computer Applications (F.1.)	2	MATE 442 Advanced Materials Laboratory II	1
MATH 241 Calculus IV	4	MATE 443 Advanced Materials Laboratory III	1
MATH 242 Differential Equations	4	MATE 434 Welding Engineering I	3
ME 211 Engineering Statics	3	MATE 461 Senior Project	1
PHYS 132 General Physics	4	MATE 462 Senior Project	4
PHYS 133 General Physics	4	MATE 463 Undergraduate Seminar	1
BIO 220 Physiology and Biological Adaptation (B.1.b., E.2.)	4	ECON 201/ECON 211/ECON 222 (D.3.)	3
ENGL 215 Writing: Argumentation or ENGL 218 Professional Writing: Argumentation and Reports (A.4.)	4	PHIL 230/PHIL 231 Philosophical Classics (C.1.)	3
SPC 201 Public Speaking or SPC 202 Principles of Speech Communication (A.3.)	3	² ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	3
² Arts and humanities elective (Area C)	3	² Critical reading elective (C.1.)	3
	51	² Literature, philosophy, arts (300–400 level) (C.3.)	3
Junior		⁷ Mathematics elective	3
MATE 401 Electronic Properties of Materials	3	Electives	3
⁴ MATE 402, 412 Mechanical Behavior of Materials/Lab	4,2		52
			208

¹ ETME 141 or ETME 143 or other drafting course may be substituted.

² To be selected in accordance with the General Education-Breadth and EAC-ABET requirements. (Please see page 77 of this catalog.)

³ Select 4 units from: IME 141, 142, 143, or IT 141, 302.

⁴ To be taken concurrently.

⁵ May substitute CSC 118, 204.

⁶ IME 426 may be substituted.

⁷ Any 300-level or higher MATH, STAT, or CSC course in linear algebra, advanced calculus, or statistics.

B.S. MATERIALS ENGINEERING

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

	<i>Units</i>
MAJOR COURSES	
MATE 121 Introduction to Materials Engineering	1
MATE 122 Intro. to Materials Engineering Analysis ...	1
MATE 206, 241 Materials Engineering and Lab	3,1
MATE 224 Metallography	3
MATE 226, 246 Physical Metallurgy and Lab	4,2
MATE 401 Electronic Properties of Materials	3
MATE 402, 412 Mechanical Behavior of Materials, Laboratory	4,2
MATE 403 Materials Inspection	3
MATE 404 Failure Analysis	3
MATE 421 Materials Thermodynamics I	3
MATE 422 Materials Thermodynamics II	3
MATE 424 Ceramic Materials	3
MATE 425 Corrosion Engineering	4
MATE 426 Fracture of Materials	3
MATE 427 Composites	3
MATE 428 Polymers	3
MATE 429 Instrumental Analysis	3
MATE 430 Microelectronics Materials Processing	3
MATE 434 Welding Engineering I	3
MATE 441 Advanced Materials Laboratory I	1
MATE 442 Advanced Materials Laboratory II	1
MATE 443 Advanced Materials Laboratory III	1
MATE 461 Senior Project	1
MATE 462 Senior Project	4
MATE 463 Undergraduate Seminar	1
	<hr/> 70
SUPPORT COURSES	
* = Courses satisfy General Education and Breadth requirements	
CE 204 Strength of Materials	3
CE 205, 206 Strength of Materials and Lab	2,1
CHEM 124 General Chemistry (B.1.a.)*	4
CHEM 125 General Chemistry	4
CHEM 305 Physical Chemistry	3
CHEM 306 Physical Chemistry	3
CSC 251 Digital Computer Applications (F.1.)* (or CSC 118, 204)	2
EE 201, 251 Electric Circuits Theory and Lab	3,1
ETME 142 Engineering Drawing I (or ETME 141, 143 or other drafting course)	1
IME 314 Engineering Economics (or IME 426)	3
Manufacturing processes electives (select from:	
IME 141, IME 142, IME 143, IT 141, IT 302)	2,2
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II (B.2.)*	4
MATH 143 Calculus III	4
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4

Mathematics elective (any 300-400 level MATH, STAT or CSC course in linear algebra, advanced calculus or statistics)	3
ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
ME 313 Heat Transfer	3
PHYS 131 General Physics (B.1.a.)*	4
PHYS 132 General Physics	4
PHYS 133 General Physics	4
	<hr/> 78

GENERAL EDUCATION AND BREADTH

To be selected according to GEB and EAC/ABET requirements. Please see page 77 for selection of GEB electives. At least 9 units must be at the 300-400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/218 (A.4.)	
Area B:	2
<i>A minimum of 18 units is required; 16 of the units are in Support</i>	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)	
BIO 220 recommended for E.2. and B.1.b.	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300-400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
BIO 220 recommended for E.2. and B.1.b.	
Area F:	0
<i>A minimum of 2 units is required; 2 are in Support</i>	
Computer literacy (F.1.)* see Support Courses	
Total	<hr/> 57
<i>A minimum of 75 units is required; 18 of the units are in Support</i>	
ELECTIVES	3

MECHANICAL ENGINEERING DEPARTMENT

Engineering Bldg. (13), Room 252
(805) 756-1334

Faculty

Department Head, Ronald L. Mussulman

Edward H. Baker	Fredrick B. Malmborg
Ernest W. Blattner	James M. Meagher
Thomas W. Carpenter	Amrollah Mehdizadeh
Donald R. Chivens	Safwat M. A. Moustafa
William E. Clark	Ronald S. Mullisen
Otto C. Davidson	Lawrence H. Nelson
Edward R. Garner	Saeed B. Niku
Harold E. Gascoigne	William B. Patterson
Raymond G. Gordon	Ramesh T. Shah
Michael A. Iannce	Jack D. Wilson
Mark S. Johnson	Yuen Cjen Yong
James G. LoCascio	

Program

B.S. Mechanical Engineering

It is our goal to graduate students who are prepared to excel as entry-level professionals who are willing and able to grow professionally and personally through their careers. This goal is pursued through a strong education in fundamentals, meaningful introduction to applications, and development of a sense of commitment to ethical and competent professional practice and to citizenship.

The Bachelor of Science degree in Mechanical Engineering concerns itself primarily with the design, construction, and use of a wide variety of equipment ranging from manufacturing machinery and power generation equipment to consumer goods. Of primary concern to the mechanical engineer is the proper application of solid mechanics, fluid mechanics, and thermodynamics in the design, manufacturing, and use of this equipment.

Graduates obtain employment primarily with manufacturers, contractors, public utilities, and governmental agencies. They also often enhance their careers through further study in graduate programs. Types of work performed by graduates include design, engineering sales, engineering testing, engineering management, supervision of manufacturing and construction.

The curriculum gives the student a thorough grounding in mechanical engineering and a choice of specializations through adviser approved electives. Special emphasis is given to electives that prepare students for careers in the HVAC/solar and petroleum industries. Engineering courses are found in all years. In the junior and senior years, the

professional specialties include such courses as turbomachinery, robotics, advanced mechanics, mechanical design, heat and mass transfer, mechanical control systems, and solar systems. The program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Laboratories are an important part of the student's education. The student is enrolled in engineering laboratories from the beginning of the freshman year until graduation. These laboratories include work in power generation, fluid flow, heat transfer, vibration, strength of materials, electronics, controls, and others.

There are six organized student clubs associated with Mechanical Engineering: student branches of the American Society of Mechanical Engineers, the Society of Petroleum Engineers, the Society of Automotive Engineers, the American Society of Heating, Refrigerating and Air Conditioning Engineers, the Pi Tau Sigma honorary society, and the Alternative Energy Club. These clubs offer students an active program of professional and social activity.

B.S. MECHANICAL ENGINEERING

Indented courses to be taken in sequence. For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser. Courses are displayed by year.

Freshman

	Units
ME 134 Mechanical Systems (Transfer students must take ME 234)	3
ETME 141 Applied Descriptive Geometry	2
ETME 142 Engineering Drawing I	1
ETME 143 Engineering Drawing II	1
IME 142 Manufacturing Processes: Materials Joining	2
IME 143 Manufacturing Processes: Material Removal	2
ANT 201/GEOG 150/SOC 105 (D.4.a.)	3
CHEM 124 General Chemistry (B.1.a.)	4
CHEM 125 General Chemistry	4
ENGL 114 Writing: Exposition (A.1.)	4
ENGL 125/PHIL 125/SPC 125 Critical Thinking (A.2.)	3
HIST 204 History of American Ideals and Institutions (D.1.)	3
MATH 141 Calculus I (B.2.)	4
MATH 142 Calculus II	4
MATH 143 Calculus III	4
PHYS 131 General Physics (B.1.a.)	4
PHYS 132 General Physics	4
¹ Manufacturing Processes elective	1
	<hr/> 53

Sophomore

ME 211 Engineering Statics	3
ME 212 Engineering Dynamics	3
ME 236 Thermal Systems	3
CE 204 Strength of Materials	3
CE 205, 206 Strength of Materials and Lab	2,1
MATE 206, 241 Materials Engineering and Lab	3,1
PHYS 133 General Physics	4
CSC 251 Digital Computer Applications (F.1.)	2
ECON 201 Survey of Economics (D.3.)	3
ENGL 218 Professional Writing: Argumentation and Reports (A.4.)	4
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
MATH 318 Advanced Engineering Mathematics (B.2.)	4
POLS 210 American and California Government (D.1.)	3
PSY 201/PSY 202 General Psychology (E.1.)	3
SPC 201 Public Speaking or SPC 202 Principles of Speech Communication (A.3.)	3

53**Junior**

ME 302 Thermodynamics	3
ME 313 Heat Transfer	3
ME 318 Mechanical Vibrations	4
ME 326 Intermediate Dynamics	4
ME 328 Introduction to Design	4
ME 329 Intermediate Design	4
ME 341 Fluid Mechanics	3
ME 342 Fluid Mechanics	3
ME 343 Thermal Science Laboratory	1
ME 344 Thermal Engineering	4
ME 345 Fluid Mechanics Laboratory	1
EE 201, 251 Electric Circuit Theory and Lab	3,1
EE 321, 361 Electronics and Lab	3,1
BIO 220 Physiology and Biological Adaptation (B.1.b., E.2.)	4
HIST 315 Modern World History (D.2.)	3
² Critical reading elective (C.1.)	3
	<hr/> 52

Senior

ME 428 Design	4
ME 440 Thermal System Design	4
ME 422 Mechanical Control Systems	4
ME 461 Senior Project	2
ME 462 Senior Project	3
ME 463 Undergraduate Seminar	1
EE 325, 365 Energy Conversion Electromagnetics, Laboratory	3,1
PHIL 230/PHIL 231 Philosophical Classics (C.1.)	3
² ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)	3
² Arts and humanities elective (Area C)	3
² Critical reading elective (C.1.)	3
² Fine and performing arts elective (C.2.)	3
² Literature, philosophy, arts elective (300-400 level) (C.3.)	3
Adviser approved electives to complete major	12
	<hr/> 52
	<hr/> 210

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Mechanical Engineering and other subjects.

¹ Choose one unit from IME 141, IT 141 or IT 327.

² To be selected in accordance with General Education-Breadth and A.B.E.T. requirements. (Please see page 77 of this catalog.)

B.S. MECHANICAL ENGINEERING

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

	Units
ETME 141 Applied Descriptive Geometry.....	2
ETME 142 Engineering Drawing I.....	1
ETME 143 Engineering Drawing II.....	1
ME 134 Mechanical Systems (Transfer students must take ME 234)	3
ME 211 Engineering Statics.....	3
ME 212 Engineering Dynamics.....	3
ME 236 Thermal Systems	3
ME 302 Thermodynamics.....	3
ME 313 Heat Transfer.....	3
ME 318 Mechanical Vibrations.....	4
ME 326 Intermediate Dynamics.....	4
ME 328 Introduction to Design.....	4
ME 329 Intermediate Design.....	4
ME 341 Fluid Mechanics.....	3
ME 342 Fluid Mechanics.....	3
ME 343 Thermal Science Laboratory	1
ME 344 Thermal Engineering	4
ME 345 Fluid Mechanics Laboratory	1
ME 422 Mechanical Control Systems.....	4
ME 428 Design.....	4
ME 440 Thermal System Design	4
ME 461 Senior Project	2
ME 462 Senior Project	3
ME 463 Undergraduate Seminar	1
Adviser approved elective courses	12
	<hr/> 80

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

CE 204 Strength of Materials	3
CE 205, 206 Strength of Materials and Lab	2,1
CHEM 124 General Chemistry (B.1.a.)*	4
CHEM 125 General Chemistry (B.1.a.)*	4
CSC 251 Digital Computer Applications (F.1.)*	2
EE 201, 251 Electric Circuit Theory and Lab	3,1
EE 321, 361 Electronics and Lab.....	3,1
EE 325, 365 Energy Conversion Electromagnetics, Laboratory	3,1
IME 142 Manufacturing Processes: Materials Joining .	2
IME 143 Manufacturing Processes: Material Removal	2
MATE 206, 241 Materials Engineering and Lab	3,1
MATH 141 Calculus I (B.2.)*	4
MATH 142 Calculus II	4
MATH 143 Calculus III	4
MATH 241 Calculus IV	4
MATH 242 Differential Equations	4
MATH 318 Advanced Engineering Mathematics	4
PHYS 131 General Physics (B.1.a.)*	4

PHYS 132 General Physics	4
PHYS 133 General Physics	4
Manufacturing Processes elective	1
(IME 141, IT 141 or IT 327)	
	<hr/> 73

GENERAL EDUCATION AND BREADTH

To be selected according to GEB and ABET requirements. Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.

Area A:	14
A minimum of 14 units is required	
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.) ENGL 218 recommended.	
Area B:	2
A minimum of 18 units is required; 16 of the units are in Support	
Physical science (B.1.a.)* see Support Courses	
Life Science (B.1.b.)	
BIO 220 recommended for B.1.b. and E.2.	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.)	
POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100	
BIO 220 recommended for E.2. and B.1.b.	
Area F:	0
A minimum of 2 units is required; 2 of the units are in Support	
Computer literacy (F.1.)* see Support Courses	
Total.....	<hr/> 57
A minimum of 75 units is required; 18 of the units are in Support	
ELECTIVES	0

210



KEYBOARD LAB

Music Professor Terry Spiller directs students who are practicing to improve their skills in the new Keyboard Lab. *Photo by Doug Allen.*

College

of

LIBERAL ARTS

College of Liberal Arts

Faculty Office Bldg. (47), Room 31
(805) 756-2706

Paul J. Zingg, Dean
Harry W. Sharp Jr., Associate Dean
Susan Currier, Interim Associate Dean

Department:	Program:
	Values, Technology and Society: Minor Women's Studies: Minor
Art and Design	Applied Art and Design: BS Art: Minor
English	English: BA, MA, Minor Linguistics: Minor
Foreign Languages	French: Minor German: Minor Spanish: Minor
Graphic Communication	Graphic Communication: BS, Minor
History	History: BA, Minor
Journalism	Journalism: BS
Liberal Studies	Liberal Studies: BA
Music	Music: BA, Minor
Philosophy	Philosophy: BA, Minor
Political Science	Political Science: BA International Relations: Minor Public Administration: Minor
Psychology and Human Development	Human Development: BS Psychology: MS, Minor Gerontology: Minor
Social Sciences	Social Sciences: BS Anthropology & Geography: Minor
Speech Communication	Speech Communication: BA, Minor
Theatre and Dance	Dance: Minor Theatre: Minor

The College includes disciplines which represent four broad areas of knowledge: the fine and performing arts, communications, humanities, and social sciences. While the College has great breadth and diversity, unity is found in a study of the most engaging subject of all . . . human endeavor. Whether the focus is on imagination, politics, creativity, or rationality, there is a settled purpose: to help each student know herself or himself, to understand human values and human potential, and to understand our society and its institutions.

The College of Liberal Arts administers Study Abroad programs in London. For further information, see the section on Study Abroad programs.

In addition to extensive involvement in the instructional program, the College has a major responsibility for activities which enhance the cultural and intellectual environment of the campus. Through Cal Poly Arts, the College sponsors a full range of cultural programs, including exhibits, concerts, literary presentations, and dramatic productions; and fosters artistic development and accomplishment across the campus. Students with other talents are attracted to the College's cocurricular programs such as KCPR Radio, *Mustang Daily*, Model United Nations, Foreign Languages Club, creative writing contests, or intercollegiate forensics and debate. In addition, the College regularly sponsors a lecture series on the arts and sciences and supports both the Center for Practical Politics and Cal Poly Arts.

The College of Liberal Arts provides a record of imaginative, and reflective human experience. The College seeks to relate itself to the technological disciplines in a way that will help contribute to the solution of human problems. Accordingly, a wide range of courses is offered to serve every thoughtful individual without regard to specialized professional interests.

VALUES, TECHNOLOGY AND SOCIETY MINOR

The purpose of the Values, Technology and Society minor is to increase understanding of how technology shapes and influences modern life. Students taking the minor will have an increased understanding of the social, environmental, economic and political implications of technology in the twentieth century. They will be able to think critically about the intellectual, moral, and historical issues that technological developments pose for the future of humankind.

The courses in the minor provide an overview of technological issues, with an emphasis on the impacts technology has on organizations and society. Technology's impact on society is examined from a values and public policy perspective. Students will be able to tailor their minor program to focus on specific issues through the selection of electives in technology, society, and values areas. The minor is available to students throughout the University regardless of students' technical backgrounds.

For more information, please contact Daniel Levy, Psychology and Human Development Department.

Units

Required Courses: (16)

CSC 302 Computers and Society (F.2.)	3
ENGR 301 Technology in the 20th Century (F.2.)	3
HUM 402 Values and Technology (C.3.)	3
POLS 404 Science, Technology and Public Policy	4
PSY 494 Psychology of Technological Change	3

Elective Courses: 9-11

Students are required to take 3 elective courses, one from each category

Technology:

CE 221 Fundamentals of Transportation Engineering (3) (F.2.)	
ENVE 330 Environmental Quality Control (3) (F.2.)	
IE 319 Human Factors Engineering (3)	
IT 301 Current Technological Issues (3) (F.2.)	
PSC 110 Energy for the Present and Future (3) (B.1.a.)	
PSC 171 Nuclear Weapon Proliferation in the Post Soviet World (3) (B.1.a.)	

Society:

ANT 325 Material Culture (3)	
ANT 360 Human Cultural Adaptations (3) (D.4.b.)	
CRP 211 Introduction to Urbanization (3) (F.2.)	
FNR 101 Natural Resources Management and Society (3) (F.2.)	
POLS 304 Politics of Global Survival (4)	
SPC 380 Media Effects (4)	

Philosophy and Values:

HIST 306 History of American Technology (3)	
HUM 302 Human Values in Agriculture (3) (C.3.)	
PHIL 339 Biomedical Ethics (3) (C.3.)	
PHIL 340 Environmental Ethics (3) (C.3.)	
SPC 331 Political Advocacy and Contemporary Rhetoric (4)	
SPC/ENGL/JOUR 385 Mass Media Criticism (4)	

25-27

WOMEN'S STUDIES

Faculty Office Building (Bldg. 47), Room 25H
(805) 756-1525

Faculty

Director, Carolyn J. Stefanco

Program

Women's Studies Minor

Women's Studies is designed to provide students with an understanding of women's contributions to various areas and to women's place in history and society.

WOMEN'S STUDIES MINOR

The Women's Studies Minor is multidisciplinary and offers a comprehensive perspective of women as a principal category of scholarly investigation. The minor centers on an ability to analyze the interactions of women in political, economic, and social arenas. Students are provided with a focused academic foundation appropriate to advanced study and career opportunities related to social science and services, health science and services, and disciplines requiring an understanding of women from a scholarly perspective.

	<i>Units</i>
Core Courses (15)	
WS 301 Introduction to Women's Studies	3
WS 401 Seminar in Women's Studies	3
WS 411 Women, Race and Class (D.4.b.)	3
HIST 434 American Women's History to 1870 or HIST 435 American Women's History since 1870	3
PSY 314 Psychology of Women	3
Electives	12
Courses from a variety of departments which analyze women and gender issues are offered every quarter. The courses are chosen by the student and require the approval of a Women's Studies adviser or the Women's Studies Director.	

ART AND DESIGN DEPARTMENT

**Dexter Bldg. (34), Room 170
(805) 756-1148**

Faculty

Department Chair, Charles W. Jennings

Robert S. Densham	Mary LaPorte
Keith W. Dills	Norman Lerner
Clarissa Hewitt	John P. Mendenhall
Robert Howell	Robert Reynolds
George D. Jercich	Joanne Beaule Ruggles
Eric B. Johnson	Henry Wessels

Programs

B.S. Applied Art and Design
with Concentrations in:
Graphic Design
Photography

Art Minor

The Art and Design Department offers a curriculum leading to the Bachelor of Science degree in Applied Art and Design which prepares students for professional participation in the fields of graphic design or photography. The department also offers an Art Minor.

Both the graphic design and photographic concentrations support creative and aesthetic growth and require the development of technical skills as a foundation for personal direction and enrichment. Courses are also offered in the areas of art history and appreciation, studio art, and 3-dimensional design. The department has made a commitment to cultural diversity. Wherever possible, this commitment is evidenced by the inclusion of material which identifies significant multicultural influences on the content of the courses in our curriculum. In addition to the major and support programs, general education courses are available for all students to enrich their understanding, appreciation, and practical skills.

Because art and design are increasingly relevant to many professional fields, art courses are frequently required within various university majors and the department provides this service through a strong and diversified program.

Curricular Concentrations

Graphic Design ¹

The curriculum in graphic design offers a foundation study of basic design, typography and design history, with specialized courses in corporate identity, packaging graphics, advertising, editorial design and illustration. Emphasis is

placed on the development of visual problem-solving methodology and acquisition of specific skills needed in the design profession. Graphic design students have the unique opportunity to work with students in the applied photography program as well, gaining practical experience in the art director and photographer relationship. Coursework in computer-assisted design allows for an exploration of new technology, while classes in graphic communication provide technical knowledge of print production. The graphic design program culminates in the study of professional practices and the preparation of a portfolio, enabling students to pursue a career in the area of their particular interest.

Photography

The photography concentration is a diversified program in commercially oriented photography stressing careers in advertising, product illustration, portraiture, corporate and editorial communications and fashion. Creative problem solving is emphasized within a context of a wide range of visual communication and expressive projects. Studio and location lighting are emphasized as well as the development of professional quality printing skills. Courses progress from black and white to color printing, large-format photography, multimedia, corporate editorial, fashion and illustration as well as computerized electronic imaging. Development of the individual student's creative, expressive abilities is a key ingredient throughout the program. The concentration also includes a study of the history of photography as well as current professional practices and also includes opportunities to work on joint projects with graphic design students.

¹ The Graphic Design concentration of the Art and Design Department is distinguished from the Design Reproduction Technology concentration of the Graphic Communication Department. By focusing on creative problem solving and development of design and layout skills, the Graphic Design concentration leads to positions such as graphic designer, art director and creative director for advertising agencies, design studios and corporate design departments.

The Graphic Communication Department's Design Reproduction Technology concentration focuses on the technical and electronic aspects of transforming design into suitable fashion for reproduction in print media. The concentration leads to positions such as account executive, sales representative, estimator, production coordinator, and other positions requiring a technical understanding of design preparation and reproduction.

B.S. APPLIED ART AND DESIGN

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

	Units		
MAJOR COURSES		ECON 201/211/222 (D.3.)	
* = Courses satisfy GEB requirements		ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ART 101 Fundamentals of Drawing (C.2.)*	4	ANT/BUS/ECON/GEOG/POLS/SOC/WS elective	
ART 131 2-Dimensional Design Fundamentals	3	(300–400 level) (D.4.b.)	
ART 132 Beginning Color Theory	3	Area E:	5
ART 134 3-Dimensional Design I	3	PSY 201/PSY 202 (E.1.)	
Select two: ART 211/212/213 Art History	4,4	BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
ART 221 Basic B/W Photography	3	Area F:	6
ART 222 35mm Intermediate B/W Photography	3	Computer literacy elective (F.1.)	
ART 224 35mm Advanced B/W Photography	3	Technology elective (300–400 level) (F.2.)	
ART 231 Computer Imaging and Design	3	Total	72
Select two: ART 310/311/312 Art History	4,4	<i>A minimum of 79 units is required; 7 of the units are in Major Courses.</i>	
ART 460 Professional Practices	2	ELECTIVES	10
ART 461 Senior Project	3		198
ART 462 Senior Portfolio Project	1	CONCENTRATIONS (select one)	
ART 463 Undergraduate Seminar	2	Graphic Design Concentration	
PHIL 351 Traditional Theories of Aesthetics or		ART 133 Color and Design	3
PHIL 352 Contemporary Problems in		ART 201 Intermediate Drawing or elective	3
Aesthetics (C.3.)	3	ART 232 Beginning Graphic Design	3
3-D Studio approved electives (9)		ART 313 Design History	3
ART 108, 135, 242, 245, 255	6	ART 331 Typographic Design	3
ART 308, 343, 344, 345, 346, 355, 356	3	ART 332 Symbolology	3
Concentration courses (see below)	55	ART 333 Corporate Identity	3
	116	ART 430 Advanced Typographic Design	3
		ART 431 Package Design	3
		ART 432 Advertising Design	3
		ART 433 Editorial Design	3
		GRC 300 Typography	4
		Adviser approved electives (18)	
		ART 204, 301, 302, 303, 304, 305, 306, 464	15
		ART 307, 336, 408; TH 430, 434; GRC 101	3
			55
		Photography Concentration	
		ART 314 History of Photography	4
		ART 320 Fashion Photography	3
		ART 321 Photographic Expression: B/W	4
		ART 322 Color Photography I, Negative	3
		ART 323 Color Photography II, Positive	3
		ART 325 4x5 Camera Techniques, B/W	3
		ART 326 4x5 Camera/Commercial	3
		ART 327 Portraiture B/W	3
		ART 424 Multimedia Photography	4
		ART 426 Illustration Photography I, B/W	3
		ART 427 Illustration Photography II, Color	3
		ART 428 Commercial Photography	4
		Adviser approved electives (15)	
		ART 133, 201, 204, 301, 302, 303, 304, 305,	
		306, 336, 464, 465	9
		TH 330, 342, 430, 434; GRC 101	6
			55
GENERAL EDUCATION AND BREADTH			
See page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level. Additional GEB courses are listed under Major courses.			
Area A:	14		
ENGL 114 (A.1.)			
ENGL 125/PHIL 125/SPC 125 (A.2.)			
SPC 201/SPC 202 (A.3.)			
ENGL 215 or 218 (A.4.)			
Area B:	18		
Physical and life sciences electives (one each, one with lab) (B.1.)			
Mathematics elective (B.2.)			
Mathematics or statistics elective (B.2.)			
Mathematics, statistics or science elective (Area B)			
Area C:	11		
A minimum of 18 units is required; 7 of the units are in Major Courses.			
PHIL 230/PHIL 231 (C.1.)			
Critical reading electives (C.1.)			
*see Major Courses (C.2.)			
*see Major Courses (C.3.)			
Arts and humanities elective (Area C)			
Area D:	18		
HIST 204 (D.1.), POLS 210 (D.1.)			
HIST 315 (D.2.)			

ART MINOR

The Art Minor offers two areas of concentration: 2-dimensional or 3-dimensional art. Students who wish to pursue the minor should meet with one of the following advisers from the Art and Design Department: Robert Reynolds, Clarissa Hewitt, George Jercich, Henry Wessels or Keith Dills.

	<i>Units</i>
Core courses.....	15
ART 101 Fundamentals of Drawing (4) (C.2.)	
ART 108 Fundamentals of Sculpture (4) (C.2.)	
ART 112 Survey of Western Art (3) (C.2.)	
ART 312 Art History—Contemporary Art (4) (C.3.)	
After consultation with an Art and Design Department adviser, complete a minimum of 3 units from courses listed below	3
ART 201 Intermediate Drawing (3)	
ART 204 Beginning Watercolor (3)	
ART 242 Glassblowing (3)	
ART 245 Ceramics I (3)	
ART 255 Jewelry Design (3)	
After consultation with an Art and Design Department adviser, complete 12 units from courses listed below	12
ART 301 Advanced Drawing (3)	
ART 302 Life Drawing I (3)	
ART 303 Life Drawing II (3)	
ART 304 Advanced Watercolor (3)	
ART 305 Painting Techniques (3)	
ART 310 Art History—American Art (4)	
ART 311 Art History—Modern Art (4)	
ART 313 Design History (3)	
ART 308 Advanced Sculpture (3)	
ART 343 Selected Advanced Topics in Glass (4)	
ART 344 Glass Fusing and Forming (3)	
ART 345 Ceramics II (3)	
ART 346 Ceramics III (3)	
ART 355 Metalsmithing (3)	
ART 356 Jewelry Casting (3)	
ART 311 Art History—Modern Art (4)	
ART 313 Design History (3)	

ENGLISH DEPARTMENT

**Faculty Office Bldg. (47), Room 32-E
(805) 756-2596**

Faculty

Department Chair, Brent Keetch

Kathleen A. Balgley	Kathleen M. Lant
John Battenburg	Donald P. Lazere
Carl R. V. Brown	Nancy Lucas
Kenneth J. Brown	Carol MacCurdy
Kevin Clark	Steven R. Marx
Susan Currier	Matthew S. Novak
Isaac Elimimian	Michael P. Orth
Angela M. Estes	Habib Sheik
Katharine S. Gittes	James E. Simmons
Mary F. Godfrey	Richard K. Simon
Linda H. Halisky	Douglas B. Smith
John C. Hampsey	Charles W. Strong
John F. Harrington	Gerald J. Sullivan
Robert L. Inchausti	Evelyn M. Torres
David J. Kann	Patricia Troxel
Douglas Keesey	Michael J. Wenzl
Alfred Landwehr	

Students interested in any of these programs should write or visit the department office for details.

In cooperation with the University Center for Teacher Education, the English Department prepares undergraduates and graduates for careers in secondary school teaching. Students interested in English teaching careers should contact the Coordinator of English Education, (English Department), to learn more about the California single subject credential. English majors who have an interest in teaching at the elementary level are advised to complete concurrently the waiver requirements for Liberal Studies. For more information regarding teaching credential programs, see the University Center for Teacher Education section.

The department supports the concept of international education and encourages students to investigate opportunities for overseas study. For further information, see the Study Abroad programs.

Programs

B.A. English

M.A. English

English Minor

Linguistics Minor

Certificates: Teaching English as a Second Language
Technical Communication

The English Department serves students through courses in writing, in technical communication, in literature, and in linguistics. The aim of the department is to provide students with greater expressive power, and with understanding and appreciation of literature. The department also endeavors to develop in students abilities valuable in the professional and business world and in private life: the abilities of reading critically, of organizing a large body of information, and of expressing the results in clear, forceful prose.

The department offers general education courses, courses for elective credit, minors in English and Linguistics, and the Bachelor of Arts and the Master of Arts programs. An English major or minor is valuable as preparation for law, for business, for teaching, and for other careers in which handling and expressing ideas are essential. The department also offers upper-division certificate programs in teaching English as a second language and technical communication.

B.A. ENGLISH

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements

	Units
ENGL 251/252/253 Great Books of World Literature (C.1.)*	3
ENGL 290 Introduction to Linguistics	4
ENGL 302 Writing: Advanced Composition or ENGL 326 Literary Criticism	4
ENGL 325 Creative Writing	4
ENGL 330/331/332 British Literature	4,4
ENGL 333/334 British Literature	4
ENGL 339 Introduction to Shakespeare	3
ENGL 340, ENGL 341 American Literature	4,4
ENGL 345 Women Writers or ENGL 346 Ethnic American Literature	4
ENGL 350/351/352 Modern Novel, Poetry, or Drama	3
ENGL 390/395/495/497/498	4
ENGL 460 Senior Project Seminar	1
ENGL 461 Senior Project	3
English elective (300–400 level)	3
English electives (400 level)	19
	<hr/> 75

SUPPORT COURSES

Foreign language (200 level or above)	4
	<hr/> 4

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level. Additional GEB courses are listed under Major and Support courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201 or 202 (A.3.)	
ENGL 215 or 218 (A.4.)	
Area B:	18
Physical and life sciences electives (one each, one with lab) (B.1.)	
Mathematics elective (B.2.)	
Mathematics or statistics elective (B.2.)	
Mathematics, statistics or science elective (Area B)	

Area C:	15
A minimum of 18 units is required; 3 of the units are in Major Courses	
PHIL 230/PHIL 231 (C.1.)	
(C.1.)* see Major Courses	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (excluding ENGL) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	6
Computer literacy elective (F.1.)	
Technology elective (300–400 level) (F.2.)	
Total	<hr/> 76
A minimum of 79 units is required; 3 of the units are in Major Courses	
ELECTIVES	31

186

CURRICULUM FOR ENGLISH MINOR

	<i>Units</i>
Required Courses	14
ENGL 253 Great Books (3)	
ENGL 302 Advanced Composition or ENGL 326 Literary Criticism (4)	
ENGL 339 Introduction to Shakespeare (3)	
ENGL 390 Modern English Grammar or ENGL 395 History of the English Language (4)	
Select one of the following British literature courses.....	4
ENGL 330 British Literature: Medieval Period (C.3.)	
ENGL 331 British Literature: The Renaissance (C.3.)	
ENGL 332 British Literature: The Enlightenment (C.3.)	
ENGL 333 British Literature: The Romantic Movement (C.3.)	
ENGL 334 British Literature: The Victorians (C.3.)	
Select one of the following American literature courses	4
ENGL 340 American Literature to 1860 (C.3.)	
ENGL 341 American Literature 1860-1914 (C.3.)	
ENGL 342 American Literature 1914 to the Present (C.3.)	
Select one of the following courses	3
ENGL 350 Modern Novel (C.3.)	
ENGL 351 Modern Poetry (C.3.)	
ENGL 352 Modern Drama (C.3.)	
	<hr/> 25

CURRICULUM FOR LINGUISTICS MINOR

	<i>Units</i>
Required courses	11
ANT 333 Language and Culture (3)	
ENGL 290 Introduction to Linguistics (4)	
ENGL 391 Topics in Applied Linguistics (4)	
Adviser approved electives, which may include:.....	15-16
ENGL 390 Modern English Grammar (4)	
ENGL 395 History of the English Language (4)	
ENGL 497 Theories of Language Learning and Teaching (4)	
SPC 316 Intercultural Communication (3)	
	<hr/> 26-27

**TEACHING ENGLISH AS A SECOND LANGUAGE
CERTIFICATE**

The Teaching English as a Second Language (TESL) Certificate provides individuals with specialized training to teach successfully in a wide variety of ESL programs. Both under-graduate and graduate students currently enrolled in any degree program at Cal Poly may pursue this certificate. The TESL program is comprised of courses from the departments of English, Social Sciences, and Speech Communication.

The TESL Certificate is designed for two career options:

- (1) The Post-Secondary/Adult option prepares individuals to teach in college level and adult education programs. Those wishing to teach at the college level are advised that an M.A. in English or a related field is the usual minimum requirement for full-time positions.
- (2) The K-12 option prepares individuals having a single or multiple subject credential to teach ESL in elementary and secondary schools. Certain courses in this program will assist persons in receiving the California Supplementary Authorization in ESL.

The TESL Certificate Program requires 29 units of study and provides prospective ESL teachers a solid background in theoretical and applied linguistics, cross-cultural communication, language and culture, second language acquisition, and methods of TESL. A practicum allows individuals supervised experience within the ESL classroom. Questions concerning the TESL Certificate should be addressed to the Program Coordinator in the English Department.

**TECHNICAL COMMUNICATION CERTIFICATE
PROGRAM**

This program requires between 26 and 30 units—about the same number as a minor. A current course list is available in the English Department office.

The certificate program is designed for men and women who have or want careers in technical writing, information development, or business communication, or who want to supplement their technical training with communication training. Students may be enrolled in Cal Poly undergraduate or graduate degree programs, or, through Concurrent Enrollment, may be enrolled only in the certificate program.

Businesses and government agencies employ professional communicators in many roles: writers, editors, public relations officers, spokespeople, and so on. These professionals' skills center on using the written word effectively, but often include auxiliary skills, such as public speaking or publications design and production. They write regulations, brochures, forms, technical manuals, computer documentation, and put technical information into understandable prose.

MASTER OF ARTS DEGREE IN ENGLISH

General Characteristics

This program includes the study of literary criticism, language, theory of composition, and literature. It is designed to provide students with the kind of knowledge and command of English that will prepare them specifically for:

- 1) teaching English at the elementary, secondary, or community college levels;
- 2) employment in business, industry, and government service where specific communication skills are demanded;
- 3) self-directed development in writing;
- 4) graduate work at other institutions.

Prerequisites

Admission with classified status requires that the student have a baccalaureate in English from an accredited institution (or the equivalent, as determined by the English Graduate Committee), have maintained a grade point average of 3.0 for the last 90 quarter units (60 semester units), and a writing sample submitted to the English Graduate adviser. Non-native speakers should also submit TOEFL scores (Test of English as a Foreign Language). Advancement to candidacy requires approval of a formal program of study by the Graduate Committee and completion of 12 units with a grade point average of 3.0.

Program of Study

The formal program of study must include the following:

- 1) 48 units of graduate work approved by the Director of Graduate Studies and the Graduate Committee;
- 2) a grade point average of 3.0 or better in all courses taken subsequent to admission;
- 3) two years of a foreign language (e.g., French, Spanish, German) or certification of the equivalent;
- 4) a comprehensive examination at the end of 48 units of study.

The foreign language requirement must be satisfied before the comprehensive examination is taken. Students will elect an emphasis within the Master of Arts program: literature, linguistics, or writing.

Applications

Applications for admission and requests for further information should be directed to the Admissions Office. All applications should include a writing sample (a critical essay on a work of literature) and three letters of recommendation.

CURRICULUM FOR M.A. ENGLISH

	<i>Units</i>
Required courses	36
ENGL 501 Techniques of Literary Research (4)	
ENGL 502 Seminar in Critical Analysis Historical and Contemporary (4) (4)	
ENGL 503 Seminar in English Linguistics (4)	
ENGL 505 Seminar in Composition Theory (4)	
ENGL 511 Seminar in American Literary Periods (4) (4)	
ENGL 512 Seminar in British Literary Periods (4) (4)	
English electives	12
Additional units in the English 400 and 500 series, selected from one of these three emphasis areas: literature, writing or linguistics.	
	<hr/> 48

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in English and other subjects.

FOREIGN LANGUAGES AND LITERATURES DEPARTMENT

Faculty Office Bldg. (47), Room 28
(805) 756-1205

Faculty

Department Head, William Little

Hernán Castellano-Girón	William Martínez
Odile Clause	Gloria Velásquez
Bianca Rosenthal	

Programs

French Minor

German Minor

Spanish Minor

The department offers coursework in French, German and Spanish. Elementary Italian and Japanese are also offered. Instruction at all levels emphasizes active language skills to prepare the student for technical, vocational, literary, and cultural needs in California, throughout the United States and abroad. Central to the instruction is active use of a state-of-the-art language laboratory.

The department offers minors in French, German, and Spanish. Each minor consists of 28 quarter units of coursework specified by the department: a minimum of sixteen units must be upper division. At least one upper division course must be completed in residence at Cal Poly and a minimum grade point average of 2.75 must be maintained. The minor is conferred concurrently with the baccalaureate degree. For general university requirements, please refer to "Minors." Information and application forms for the declaration of a French, German, or Spanish minor are available in the Department office.

The department is active in training students who wish to obtain a bilingual teaching credential and it administers the Bilingual Proficiency Exam in Spanish and the ZDAF German Proficiency Examination in conjunction with the Goethe Institute. For more information regarding teaching, please refer to Teacher Credential Programs. The department also supports such student clubs as the French Club, the German Club, the Italian Club, the Japanese Club, the Latin American Student Association, and MECHA (Movimiento Estudiantil Chicano de Aztlán.)

CURRICULUM FOR FRENCH MINOR

Required courses	Units 20
FR 201, FR 202 Intermediate French (4) (4)	
FR 233 Critical Reading in French Literature (4) (C.1.)	
FR 301 Advanced French Composition and Grammar (4)	
FR 305 Significant Writers in French (4) (C.3)	
Electives to be chosen from the following:	8
FR 302 Advanced French Conversation and Grammar (4)	
FR 405 French Literature in English Translation (4) (C.3.)	
FR 470 Selected Advanced Topics (1–4) (repeatable to 8)	
FORL 400 Special Problems for Advanced Undergraduates (1–2)	
HUM 310 Humanities in World Cultures French (3) (C.3.)	
	<hr/> 28

CURRICULUM FOR GERMAN MINOR

Required courses	Units 20
GER 201, GER 202 Intermediate German (4) (4)	
GER 233 Critical Reading in German Literature (4) (C.1.)	
GER 301 Advanced German Composition and Grammar (4)	
GER 305 Significant Writers in German (4) (C.3)	
Electives to be chosen from the following:	8
GER 302 Advanced German Conversation and Grammar (4)	
GER 405 German Literature in English Translation (4) (C.3.)	
GER 470 Selected Advanced Topics (1–4) (repeatable to 8)	
FORL 400 Special Problems for Advanced Undergraduates (1–2)	
HUM 310 Humanities in World Cultures (German) (3) (C.3.)	
	<hr/> 28

CURRICULUM FOR SPANISH MINOR

	<i>Units</i>
Required courses.....	20
SPAN 201, SPAN 202 Intermediate Spanish (4) (4)	
SPAN 233 Critical Reading in Hispanic Literature (4) (C.1.)	
SPAN 301 Advanced Spanish Composition and Grammar (4)	
SPAN 305 Significant Writers in Spanish (4) (C.3.)	
Electives to be chosen from the following:	8
SPAN 303 Hispanic Culture (3) or	
HUM 310 Humanities in World Cultures (Spain, Chicano or Latin America) (3) (C.3.)	
SPAN 330 Spanish for Bilingual Speakers (4)	
SPAN 340 Chicano/a Authors (4)	
SPAN 405 Hispanic Literature in English Translation (4) (C.3.)	
SPAN 470 Selected Advanced Topics (1–4) (repeatable to 8)	
FORL 400 Special Problems for Advanced Undergraduates (1–2)	

 28

GRAPHIC COMMUNICATION DEPARTMENT

Graphic Arts Bldg. (26), Room 205
(805) 756-1108
(805) 756-7118 fax

Faculty

Department Head, Harvey R. Levenson

Herschel L. Apfelberg	James R. Hutchinson
Michael L. Blum	W. Stephen Mott
Gary G. Field	Patrick A. Munroe
Henry J. Heesch	Philip K. Ruggles

Programs

B.S. Graphic Communication
with Concentrations in:
 Computers and Printing Technology
 Design Reproduction Technology
 Printing Management

Graphic Communication Minor

The Graphic Communication Department offers a curriculum leading to the Bachelor of Science degree. The curriculum is designed to prepare graduates for positions of responsibility in the printing, publishing, and packaging industries, and allied professions.

The program provides courses in general education together with a core of printing technology and management courses. Courses which are specific to the curricular concentrations are also provided. The student is introduced to all stages of the printing process, and chooses a specialized concentration in the graphic communication field at the appropriate time. Students are educated for leadership as managers and other skilled professionals who are well grounded in printing technology.

The Graphic Communication Department occupies 33,000 square feet of floor space in the Graphic Arts Building. Theory and practice are taught in modern classrooms incorporating the latest in teaching aids. Fourteen well-equipped laboratories of printing equipment provide the student with diverse experience in the practical aspects of the industry.

CURRICULAR CONCENTRATIONS

Computers and Printing Technology

The Computers and Printing Technology concentration is for those primarily interested in the technical aspects of the graphic arts. The emphasis of the concentration is on digital imaging including electronic color scanning, emerging

desktop applications, and digital proofing; the measurement of quality; and advanced production technologies. The concentration prepares students for positions in quality control, prepress systems management, technical sales, product development, technical and production management, and other positions requiring an understanding of computers and technology.

Design Reproduction Technology¹

The Design Reproduction Technology concentration is unique with respect to its emphasis on modern electronic graphic print technology. This is supported by an understanding of design aesthetics derived from courses with emphasis on design and print. The purpose of this program of study is to combine design with print technology, thus providing its graduates with career opportunities with considerable dynamic flexibility within the graphic arts field.

Printing Management

The Printing Management concentration is designed as a flexible program for the student interested in pursuing employment as a printing plant manager, planner, quality control specialist, production scheduler and controller, customer service representative, print buyer, print broker, estimator, or sales representative. The program also prepares students for management of related graphic communication businesses, including newspapers, commercial printing, service bureaus, business forms and specialized printing operations.

¹ The Design Reproduction Technology concentration of the Graphic Communication Department is distinguished from the Graphic Design concentration of the Art and Design Department. By focusing on the technical and electronic aspects of transforming design into suitable fashion for reproduction in print media, the concentration leads to positions such as account executive, sales representative, estimator, production coordinator and other positions requiring a technical understanding of design preparation and reproduction.

The Art and Design Department's Graphic Design concentration focuses on creative problem solving and development of design and layout skills. The concentration leads to positions such as graphic designer, art director and creative director for advertising agencies, design studios, and corporate design departments.

B.S. GRAPHIC COMMUNICATION

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements

GRC 101 Introduction to Graphic Communication ...	4
GRC 300 Typography	4
GRC 301 Electronic Publishing Systems.....	3
GRC 311 Substrates and Ink	3
GRC 324 Binding and Finishing Processes	3
GRC 327 Graphic Arts Photography.....	4
GRC 328 Film Assembly and Platemaking	3
GRC 401 Printing Marketing and Sales	3
GRC 403 Printing Estimating.....	4
GRC 411 Pricing, Costing and Web Estimating	3
GRC 414 Color Image Assembly	2
GRC 415 Sheetfed Lithographic Technology	5
GRC 416 Web Printing Technology	5
GRC 421 Printing Production Management	4
GRC 422 Printing Supervision and Personnel Issues..	4
GRC 460 Research Methods in Graphic Communication	1
GRC 461 Senior Project.....	3
CHEM 121 General Chemistry (B.1.a.)*	4
CHEM 122 General Chemistry (B.1.a.)*	4
ENGL 215 Writing: Argumentation or	
ENGL 218 Professional Writing: Argumentation	
and Reports (A.4.)*	4
GRC electives. Select units from the following	9
GRC 204, 223, 307, 326, 333, 357, 408, 429, 437	
Concentrations courses (see below)	30

109

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

¹ B.2. MATH 118 Pre-Calculus Algebra or	
MATH 120 Pre-Calculus Algebra and	
Trigonometry (B.2.)*	4
B.2. STAT 211 Elem. Probability and Stat. (B.2.)* ...	3
	7

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level. Additional GEB courses are listed under Major and Support courses.

Area A:	10
A minimum of 14 units is required; 4 of the units are in Major	
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
(A.4.)* see Major Courses	

Area B:	3
A minimum of 18 units is required; 15 of the units are in Major and Support	
Physical science (B.1.a.)*see Major Courses	
Life science elective (B.1.b.)	
Mathematics/statistics (B.2.)* see Support Courses	
Mathematics, statistics or science elective (Area B)	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	6
Computer literacy elective (F.1.)	
Technology elective (300–400 level) (F.2.)	
Total.....	60
A minimum of 79 units is required; 19 of the units are in Major and Support Courses	
ELECTIVES	10
	186

¹ MATH 116 and MATH 117 will substitute for MATH 118 and are taught at a slower pace for those who need more review. MATH 117 satisfies GEB Area B.2.

CONCENTRATIONS (select one)**Computers and Printing Technology Concentration**

CSC 204 C and UNIX.....	3
CSC electives (in addition to GEB F.1.)	8
PHYS 121 College Physics	4
PHYS 122 College Physics	4
GRC 302 New Technologies in Graphic Comm.	3
GRC 331 Color Quality Control	4
GRC 432 Imaging Systems Management.....	4
	<hr/> 30

Design Reproduction Technology Concentration

ART 131 2-D Design Fundamentals	3
ART 132 Beginning Color Theory	3
ART 133 Color and Design	3
ART 331 Typographic Design	3
ART 332 Symbolology	3
ART 333 Corporate Identity	3
GRC 438 Electronic Art Preparation	4
GRC 439 Line and Halftone Media for Books and Publications	4
GRC 440 Advanced Copy Technology for Newspapers and Magazines	4
	<hr/> 30

Printing Management Concentration

BUS 207 Business Law	4
ACTG 211 Financial Accounting for Nonbusiness Majors.....	4
MKTG 204 Elements of Marketing	4
GRC 302 New Technologies in Graphic Comm.	3
GRC 331 Color Quality Control	4
GRC 423 Printing Labor Relations	4
GRC 432 Imaging Systems Management.....	4
Select a minimum of 3 units from the following:	3
ENGL 310, SPC 301, or any 300-400 level BUS/MKTG/ACTG course selected with adviser approval	
	<hr/> 30

GRAPHIC COMMUNICATION MINOR

A minor in Graphic Communication will benefit students interested in pursuing careers in graphic communication or who anticipate using graphic communication in another career. Students in the minor will have a competitive edge when applying for many jobs by understanding concepts, and gaining knowledge and skills in computer applications and desktop publishing, typography and specifying the processes and materials for a broad range of printing and publishing applications. Information and application forms for the declaration of this minor are available in the Graphic Communication Department office.

	<i>Units</i>
Required Core	21
GRC 101 Introduction to Graphic Communication (4)	
GRC 277 Computer Applications in Desktop Publishing (3) (F.1.)	
GRC 300 Typography (4)	
GRC 312 Substrates and Ink: Applications (2)	
GRC 325 Finishing Processes: Applications (2)	
GRC 329 Prepress Methods and Procedures (3)	
GRC 330 Print Reproduction Processes (3)	
Choose 4 units from the following.....	4
GRC 357 Screen Printing Technology (2)	
GRC 408 Newspaper and Publications Management (3)	
GRC 437 Consumer Packaging (3)	
GRC 438 Electronic Art Preparation (4)	
GRC 474 Applied Graphic Communication Practices (2)	
	<hr/> 25

HISTORY DEPARTMENT

Faculty Office Bldg. (47), Room 27C
(805) 756-2543

Faculty

Department Chair, Robert E. Burton

Timothy M. Barnes	Daniel E. Krieger
Lloyd N. Beecher	Edward L. Mayo
Nancy L. Clark	Max E. Riedlsperger
George B. Cotkin	John Snetsinger
Manzar Foroohar	Carolyn J. Stefanco
Donald A. Grinde, Jr.	

Programs

B.A. History

History Minor

Historians study the past in its variety and complexity. With such an analysis, students of history gain multiple perspectives on the present and an aptitude to plan intelligently for the future. Although the lessons to be learned from the past are rarely simple, solutions to present-day problems rest on comprehension of historical forces and events.

History deepens our understanding of other peoples and cultures. All courses offered in the History Department seek to examine the issues of race, gender, class, and cultural diversity.

Majoring in history is excellent preparation for students interested in a teaching career, the legal profession, or advanced work in the discipline. Students wishing to become business executives, administrators, and public servants profit immensely by gaining the methodological skills of the historian. Historians learn to gather, synthesize, analyze, and interpret evidence; they become skilled in presenting their conclusions to a general audience in a lucid and logical manner.

The study of history and its method prepares students for a wide range of careers while also sensitizing them to the complexity and diversity of the past and present. History is an excellent foundation for a broadly based education in the liberal arts.

HISTORY MINOR

Students choosing to add a strong historical dimension to their major field may enroll in the minor program in history. This 30-unit curriculum stresses reading and writing skills as well as the ability to weight evidence and think critically. Details and application forms are available from the History Department.

	<i>Units</i>
Required courses	15
HIST 101, HIST 102, HIST 103 History of Western Civilization (3) (3) (3)	
HIST 201 United States History (3)	
HIST 300 Research Methods (3)	
Select 3 units of upper-division United States history ...	3
HIST 385, 401, 402, 404, 405, 406, 407	
Select 6 units from outside the areas of U.S. and European history.....	6
HIST 307, 314, 328, 329, 339, 340, 341, 381, 382, 415, 416, 417	
Select 6 units in any 300–400 history courses	6
(excluding HIST 315)	
	30

B.A. HISTORY

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements

	Units
HIST 101 History of Western Civilization	3
HIST 102 History of Western Civilization	3
HIST 103 History of Western Civilization	3
HIST 201 United States History (D.1.)*	3
HIST 300 Research Methods.....	3
HIST 301 Writing and Research Seminar in History ..	3
HIST 302 Historiography	3
HIST 460 Senior Project.....	2
HIST 461 Senior Project.....	2
History electives (300–400 level).....	21
Foreign language requirement, select one:	
FR 202, GER 202, SPAN 202	4
	<hr/> 50

SUPPORT COURSES

Electives (100–200 level)	11
Electives (300–400, including History)	23
	<hr/> 34

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level. Additional GEB courses are listed under Major and Support courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	18
Physical and life sciences electives (one each, one with lab) (B.1.)	
Mathematics elective (B.2.)	
Mathematics/statistics elective (B.2.)	
Science, mathematics or statistics elective (Area B)	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	

Area D: 15

A minimum of 18 units is required; 3 of the units are in Major

History (D.1.)*see Major Courses

POLS 210 (D.1.)

HIST 315 (D.2.)

ECON 201/211/222 (D.3.)

ANT 201/GEOG 150/SOC 105 (D.4.a.)

ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)

Area E: 5

PSY 201/PSY 202 (E.1.)

BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)

Area F: 6

Computer literacy elective (F.1.)

Technology elective (300–400 level) (F.2.)

Total.....

A minimum of 79 units is required; 3 of the units are in Major Courses 76

ELECTIVES..... 26

186

JOURNALISM DEPARTMENT

Graphic Arts Bldg. (26), Room 227
(805) 756-2508

Faculty

Department Head, Nishan R. Havandjian

Clay Carter
Randall L. Murray

Victor Valle

Program

B.S. Journalism

The Journalism Department offers a professional program leading to the Bachelor of Science degree in Journalism. All majors must complete the basic journalism core courses in addition to a list of restricted electives from which they can choose.

In consultation with their academic advisers, majors can put together specific curriculum packages which maximize their preparation for future careers in the newspaper and magazine industry, in radio and television news, in public relations, or in agricultural communication.

The Journalism Department requires that all majors successfully complete 12 quarter units of a foreign language.

The Journalism Department conforms to the rules of the Accrediting Council on Education in Journalism and Mass Communications (ACEJMC) which stipulate that of the 193 units required for a bachelor's degree, 131 quarter units must be taken in courses outside the major area of journalism, with no fewer than 94 quarter hours in liberal arts and sciences. Certain courses in art and graphics may be considered as professionally related to journalism and cannot be counted toward the 131 units outside the major. Students must consult advisers.

All journalism majors are expected to serve as staff members of departmental communications media, including *Mustang Daily*, the student newspaper, KCPR, the FM-stereo radio station, or the news and programming operations of CPTV, Cal Poly's developing TV station operated by the Journalism Department. They are also expected to participate in professional and scholarly organizations in their interests. The department sponsors campus chapters of the Society of Professional Journalists, and the Agricultural Communicators of Tomorrow. The department is headquarters for the California Intercollegiate Press Association (CIPA), an organization whose members consist of the student media in California universities.

The Brock Center for Agricultural Communication, a joint project of the College of Agriculture and the College of Liberal Arts, is directed by a faculty member from the Journalism Department. Majors interested in future careers in agricultural communication are encouraged to seek assistantships with the Center and participate in its activities, which consist of researching ag-related issues and writing articles for agricultural and consumer media.

B.S. JOURNALISM

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

MAJOR COURSES

Foreign language 101, 102, 103 (Spanish, French, German or other)	4, 4, 4
JOUR 203 News Writing and Reporting	4
JOUR 223 Photojournalism	3
JOUR 233 Copy Editing	4
JOUR 290 Multicultural Journalism	3
JOUR 302 Mass Media Law	4
JOUR 304 Reporting Contemporary Issues	4
JOUR 318 Mass Media in Society	4
JOUR 333 Broadcast News	4
JOUR 401 International Communication	4
JOUR 444 Media Internship	3
JOUR 460 Senior Project	3
Choose one of the following:	2,2
Choose one or both broadcast labs—4 units max/min:	
JOUR 351 Adv. Radio Reporting: KCPR (2) (2)	
JOUR 353 Adv. Television Reporting: CPTV (2) (2)	
OR	
Choose print lab twice—4 units max/min:	
JOUR 352 Advanced Newspaper Reporting: Mustang Daily (2) (2)	
Restricted Journalism electives to be selected from: ..	18
JOUR 201, 205, 312, 331, 342, 346, 385, 402, 405, 407, 413, 432, 434, 470.	
	<hr/> 74

SUPPORT COURSES

Department approved upper division electives	24
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GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	18
Physical and life sciences electives (one each, one with lab) (B.1.)	
Mathematics elective (B.2.)	
Mathematics or statistics elective (B.2.)	
Science, mathematics or statistics elective (Area B)	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	

Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	6
Computer literacy elective (F.1.)	
Technology elective (300–400 level) (F.2.)	
Total	<hr/> 79
ELECTIVES	16
	<hr/> <hr/> 193

LIBERAL STUDIES

An Interdisciplinary Program

Faculty Offices East (Bldg. 25), Room 119
(805) 756-2935

Faculty

Coordinator, Robert S. Cichowski

Program

B.A. Liberal Studies

The Bachelor of Arts degree program in Liberal Studies provides students with a broad, interdisciplinary university education. The Liberal Studies curriculum is designed in two tracks: the *Credential Track* and the *General Track*. At least 60 units must be at the 300–400 track.

Students who fulfill the *Credential Track* will also complete a waiver program approved by the California Commission on Teacher Credentialing. This waiver program satisfies the subject matter content required for a Multiple Subject Teaching Credential. By selecting free electives from a set of professional education courses, students may complete 15 units toward the credential, thus enabling them to complete requirements for a Professional Clear Credential in one year of postbaccalaureate study.

Credential Track students will select an area of emphasis from among the following: art, English, life science, mathematics, music, physical education, physical science, social science or Spanish. Courses in these areas of emphasis will be selected with the approval of the adviser. In most cases, these units will be at the upper division level and will not be double-counted for courses taken to satisfy other curriculum requirements. This area of emphasis will give depth to the student's education in subject matter of his or her choice and may enable the credential candidate to achieve a supplemental authorization to teach a specific course at the junior high school level.

The *General Track* will prepare the student with a broadly-based, interdisciplinary foundation. Employment for *General Track* students is extensive and includes: medical field, management and sales, publishing, and human resource management. Students completing the degree may choose to pursue graduate work in business, law, public service, ministry, and counseling.

B.A. LIBERAL STUDIES

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements.

LS 101 Orientation to Liberal Studies	1
LS 461 Senior Project	3
ART 111 Introduction to Art (C.2.)*	4
BIO 127 Natural History: Animal Adaptations (B.1.b)*	3
BIO 128 Natural History: Animal Communities (B.1.b.)*	3
BIO 129 Natural History: Plant Communities	3
ENGL 330–353 (C.3.)*	4
(ENGL 345/346 recommended for credential track)	
<i>Linguistics.</i> Select one course from the following:	
ENGL 390/391/395	4
MATH 118 Pre-Calculus Algebra (B.2.)*	4
MATH 327 Introduction to Modern Mathematics	4
MATH 328 Introduction to Modern Mathematics (B.2.)*	4
<i>Ethics.</i> Select one course from the following:	
PHIL 331/335/337 (GEB Area C)*	3
PSC 101 The Physical Environment: Matter and Energy	4
PSC 102 The Physical Environment: Atoms and Molecules (B.1.a.)*	4
PSC 103 The Physical Environment: Earth and the Universe	4
Foreign language electives	4,4
<i>International Cultural History.</i> One course, may be selected from: ANT 202; HIST 314, 340, 381, 383, 415	
<i>U.S. Cultural Pluralism.</i> One course to be selected from current list of USCP courses or adviser approval	
	3
	66

SUPPORT COURSES

Courses to complete track (see below, select one track)	47
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GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.

Additional GEB courses are listed under Major courses.

Area A:	14
ENGL 114 Writing: Exposition (A.1.)	
ENGL 125/PHIL 125/SPC 125 Critical Thinking (A.2.)	
SPC 201/SPC 202 Public Speaking/Principles of Speech Communication (A.3.)	
ENGL 215/ENGL 218 Writing: Argumentation/Professional Writing (A.4.)	

Area B:	0
A minimum of 18 units is required; 18 of the units are in Major	
Physical science (B.1.a.)*see Major Courses	
Life science (B.1.b.)*see Major Courses	
Mathematics/statistics (B.2.)*see Major Courses	
Area C:	7
A minimum of 18 units is required; 11 of the units are in Major	
PHIL 230/PHIL 231 Philosophical Classics (C.1.)	
Critical reading elective (C.1.)	
Critical reading elective (C.1.)	
Fine and performing arts elective (C.2.) *see Major courses	
Literature, philosophy, arts elective (300–400 level) (C.3.) *see Major Courses	
Arts and humanities elective (Area C) *see Major courses	
Area D:	18
HIST 204 History of American Ideals and Institutions (D.1.)	
POLS 210 American and California Government (D.1.)	
HIST 315 Modern World History (D.2.)	
ECON 201/211/222 Survey of Economics/Principles of Economics/Macroeconomics (D.3.)	
ANT 201/GEOG 150/SOC 105 Cultural Anthropology/Human Geography/Introduction to Sociology (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.) (GEOG 308 Global Geography required for credential track)	
Area E:	5
PSY 201/PSY 202 General Psychology (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 Physiology and Biological Adaptation (E.2.) (BIO 220 recommended)	
Area F:	6
Computer literacy elective (F.1.)	
Technology elective (300–400 level) (F.2.)	
Total	50
A minimum of 79 units is required; 27 of the units are in Major Courses	

ELECTIVES 23

Note: It is recommended that students planning to seek a Multiple Subjects Credential from Cal Poly select the following courses (for a total of 11 units) as part of their Elective units: EDUC 301, 303, 426

COURSES IN CREDENTIAL TRACK

EDUC 300 Introduction to the Teaching Profession ..	3
BIO 306 Applications of Biological Concepts or PSC 304 Applications of Physical Science	4
ENGL 260 Children's Literature	3
MATH 329 Mathematical Applications to Elementary Teaching	3
MU 360/SPC 310/TH 380	3
PSY 256 Developmental Psychology	4
MU 100 Music Fundamentals	3
PE 310 Concepts in Elementary Physical Education ..	3
Area of emphasis	21
At least 7 units must be 300–400 level.	—
	47

COURSES IN GENERAL TRACK

At least 7 units must be 300–400 level.	
Courses to complete a minor	24-30
Psychology adviser approved elective	3
Music adviser approved elective	3
Fine/performing arts adviser approved elective	3
Additional electives	14-8
	—
	47

MUSIC DEPARTMENT

**Davidson Music Center (45), Room 129
(805) 756-2406**

Faculty

Department Head, Clifton Swanson

Antonio G. Barata	Alyson McLamore
Thomas H. Davies	Craig H. Russell
William V. Johnson	John G. Russell
Frederick C. Lau	William T. Spiller

Programs

B.A. Music

Music Minor

The Music Department offers a program which develops musical skills, encourages creativity, and cultivates vision for the future. A graduate of this program will be prepared to begin specialized study at the graduate level, to enter a wide variety of professional careers, or to apply for admission to the Teacher Education Credential Program subject to the prerequisite requirements and competency examinations.

The Bachelor of Arts in Music offered at Cal Poly introduces a student to the role of music in today's world, helps form personal goals, and provides the discipline, skills and knowledge to accomplish those goals. The University's polytechnic emphasis also provides an excellent opportunity to explore music in conjunction with a wide range of other fields.

In addition, the Music Department is a valuable resource for the non-music major. Its courses and performing ensembles are open to all students who wish to enrich their lives through music. Qualified students who wish to explore the subject in depth have the opportunity to minor in music.

The Cal Poly Music Department also serves as a cultural center for both the university and the community through a program of public performances by student and faculty groups and through clinics, workshops, concerts, and lectures by outstanding individuals from outside the university.

Acceptance into the music major program requires a demonstrated ability on an instrument, in voice, or talent through other musical media.

Department Requirements

1. New students should contact the Music Department Office immediately upon arrival to arrange for placement examinations for music theory, keyboard proficiency, musicianship (dictation, sight singing), and a performance audition for applied study placement and assignment to performing ensembles. Regardless of courses taken prior to coming to Cal Poly, students will be required to remedy deficiencies before enrolling in advanced music theory or music history courses.
2. Each music major enrolled in at least 6 units of music courses must include a performance ensemble each quarter in order to qualify for applied study of voice or instruments. (See the Music Department for details regarding appropriate ensembles and applied study policies.)
3. Each student is required to attend a minimum of 6 concerts per quarter.
4. Each student must pass a piano proficiency examination in order to graduate. The examination must be taken by the end of the sophomore year and if it is not passed, the student is expected to continue to enroll in piano until it is passed.
5. Use of Music Department instruments, scheduled practice rooms, electronic studio, or lockers requires a Music Use Fee. See the Music Department Office for details.
6. It is important that each student stay closely in touch with his/her adviser in order to progress through the music major program in the most efficient manner.
7. The Music Department is not able to offer the full complement of performing ensembles and private instruction during the Summer Quarter, therefore it is important to take this into consideration when planning coursework for completion of the major.

A music major handbook giving complete details of the program, policies and forms is available from the Music Department.

B.A. MUSIC

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

	Units
MAJOR COURSES	
MU 102 Acoustic Communication	3
MU 103 Music Theory I	3
MU 104 Musicianship I	1
MU 105 Music Theory II	3
MU 106 Musicianship II	1
MU 120 Music Appreciation	4
MU 121 Introduction to World Music	3
MU 150 Applied Music	1,1,1
MU 201 Music Theory III	3
MU 208 Musicianship III	1
MU 250 Applied Music	1,1,1
MU 302 Theory IV	3
MU 304 Introduction to Music Synthesis	3
MU 320 Music Research and Writing	3
MU 321 Music History I	3
MU 322 Music History II	4
MU 323 Music History III	3
MU 326 Cultural Concepts and Structures in Music ..	3
MU 350 Applied Music	1,1,1
MU 401 Contemporary Music Theory	3
MU 420 Music History: Selected Topics	3
MU 450 Applied Music	1,1,1
MU 461 Senior Project	3
Approved music lecture courses (300–400 level)	12
Major Ensemble at 100 level with adviser approval ...	6
Major Ensemble at 300 level with adviser approval ...	6
	<hr/> 89

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	18
Physical and life sciences electives (one each, one with lab) (B.1.)	
Mathematics elective (B.2.)	
Mathematics or statistics elective (B.2.)	
Science, mathematics or statistics elective (Area B)	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	

Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	6
Computer literacy elective (F.1.)	
Technology elective (300–400 level) (F.2.)	
Total	<hr/> 79
ELECTIVES	18
	<hr/> 186

MUSIC MINOR

A 30-unit minor is available to students who desire documented competency in music. An individualized curriculum based on the following guidelines will be developed in consultation with a member of the music faculty. Information and application forms for the declaration of a Music minor are available in the Music Department Office.

	Units
Required Courses	18
MU 103 Music Theory I (3)	
MU 104 Musicianship I (1)	
MU 105 Theory II (3)	
MU 106 Musicianship II (1)	
MU 120 Music Appreciation (C.2.) (4)	
Lower division electives (3)	
One year of upper division vocal or instrumental study (3)	
Upper division electives	12
Chosen from 300–400 level Music courses (or, in some cases, specific courses offered by other departments).	
	<hr/> 30

PHILOSOPHY DEPARTMENT

Faculty Office Bldg. (47), Room 37-B
(805) 756-2041

Faculty

Department Chair, Diane P. Michelfelder

Stephen W. Ball	Paul S. Miklowitz
A. C. W. Bethel	Frederick J. O'Toole
Linda Bomstad	Ann Owens
Charles T. Hagen	Judy D. Saltzman
Laurence D. Houlgate	Talmage E. Scriven
Russell A. Lascola	Kendrick W. Walker

Programs

B.A. Philosophy

*Students may select Philosophy Electives or
 Concentration in:
 Ethics and Society*

Philosophy Minor

Students can pursue a curriculum leading to a Bachelor of Arts degree in Philosophy, including an optional concentration in Ethics and Society, and a curriculum leading to a minor in Philosophy.

The Philosophy Department offers a sequence of courses in the history of philosophy, as well as courses in the traditional fields of philosophy (logic, ethics, metaphysics, epistemology), and in the philosophical issues arising in other disciplines (e.g. philosophy of art and philosophy of science). The department also offers courses in Religious Studies.

The curriculum for the Bachelor of Arts degree provides strong preparation for careers in government, politics and business; for professional programs in law and business administration; and for graduate study in philosophy, other fields in the humanities, economics, and political science.

Curricular Concentration

Ethics and Society

This concentration is designed for students with an interest in pursuing professional careers in which they will need to address practical ethical issues, especially careers in business, medicine, politics and law.

PHILOSOPHY MINOR

The minor program in Philosophy is designed for students who want to add to their education an understanding of the history of philosophy and of philosophical issues relevant to their major field of study. It consists of 24 units (12 specified, 12 chosen from an approved list). Interested students are invited to contact the Philosophy Department Office for more information and application forms.

Required courses	Units 12
ENGL/PHIL/SPC 125 Critical Thinking (3) (A.2.)	
PHIL 230 Philosophical Classics (3) (C.1.)	
PHIL 231 Philosophical Classics (3) (C.1.)	
PHIL 311 Greek Philosophy (3) (C.3.)	

Electives to be chosen from the following groups:	12
<i>One of the following:</i>	

PHIL 312 Medieval Philosophy (3) (C.3.)
PHIL 313 Continental Philosophy: Montaigne to Leibnitz (3) (C.3.)
PHIL 314 British Philosophy: Bacon to Mill (3) (C.3.)
PHIL 315 German Philosophy: Kant to Nietzsche (3) (C.3.)

One of the following:

PHIL 316 Contemporary European Philosophy (3) (C.3.)
PHIL 317 Contemporary British and American Philosophy (3) (C.3.)

Two additional upper division philosophy courses.

B.A. PHILOSOPHY

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements

	Units
PHIL 170 Problems of Philosophy	3
PHIL 225 Symbolic Logic.....	3
PHIL 230 Philosophical Classics (C.1.)*.....	3
PHIL 231 Philosophical Classics (C.1.)*.....	3
PHIL 311 Greek Philosophy	3
PHIL 313 Continental Philosophy: Montaigne to Leibnitz	3
PHIL 314 British Philosophy: Bacon to Mill.....	3
PHIL 315 German Philosophy: Kant to Nietzsche.....	3
PHIL 321 Philosophy of Science	3
PHIL 331 Ethics.....	3
PHIL 411 Metaphysics.....	3
PHIL 412 Epistemology	3
PHIL 460 Senior Project	3
PHIL 461 Senior Project.....	3
Concentration (see below) or 300–400 level PHIL electives	18
	<hr/> 60

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	18
Physical and life sciences electives (one each, one with lab) (B.1.)	
Mathematics elective (B.2.)	
Mathematics or statistics elective (B.2.)	
Science, mathematics or statistics elective (Area B)	
Area C:	12
A minimum of 18 units is required; 6 of the units are in Major	
Philosophy (C.1.)*see Major Courses	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, arts elective (300–400 level) (excluding PHIL) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	

ANT 201/GEOG 150/SOC 105 (D.4.a.)

ANT/BUS/ECON/GEOG/POLS/SOC/WS elective
(300–400 level) (D.4.b.)

Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	6
Computer literacy elective (F.1.)	
Technology elective (300–400 level) (F.2.)	
Total.....	<hr/> 73
A minimum of 79 units is required; 6 of the units are in Major Courses	

ELECTIVES	53
	<hr/> 186

CONCENTRATION OR ELECTIVES

Select either the following concentration or 18 units of 300–400 level PHIL electives.

Ethics and Society Concentration

PHIL 332 History of Ethics	3
PHIL 333 Political Philosophy	3
PHIL 334 Jurisprudence	3
PHIL 335 Social Ethics.....	3
PHIL 337 Professional Ethics	3
PHIL 339 Biomedical Ethics	3
	<hr/> 18

Philosophy Electives

300–400 level PHIL electives.....	18
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POLITICAL SCIENCE DEPARTMENT

**Faculty Office Bldg. (47), Room 14-A
(805) 756-2984**

Faculty

Department Chair, Allen K. Settle

Randal L. Cruikshanks	Richard B. Kranzdorf
John H. Culver	Dianne N. Long
Philip L. Fetzner	Carl E. Lutrin
David L. George	Carroll R. McKibbin
Reginald H. Gooden, Jr.	Joseph N. Weatherby
Earl D. Huff	

Programs

B.A. Political Science

Students may select Individualized Course of Study or a Concentration in:

International Affairs
Pre-Law
Public Administration
Teaching
Urban Studies

International Relations Minor

Public Administration Minor

The Political Science Department offers undergraduate instruction leading to the Bachelor of Arts degree in Political Science. With a concern for theoretical principles as well as practical application, the degree requirements include both a common body of material and the completion of a curricular concentration in Political Science as listed below. Such curricular alternatives focus the training within the degree program toward career opportunities in government and other public agencies, in private enterprise, and in the legal profession.

In addition to the major in Political Science, the department offers minors in International Relations and Public Administration. Beyond that, the Political Science Department provides students in all curricula within the university with an understanding of the operations of local, state, and national government and the processes by which the individual and community interact in the several levels of government. The department supports internship opportunities in local, state, and federal agencies in addition to applied public policy research opportunities through the Center for Practical Politics.

Through the required and elective courses, the department seeks to expand each student's comprehension of the political process, to develop those understandings and skills

which are essential for effective citizenship and for leadership positions in the public and private sectors.

CURRICULAR CONCENTRATIONS

International Affairs

Prepares students for careers in government, business and related agencies which deal in the many problems in international affairs and to prepare students to enter graduate studies in the field of international relations.

Pre-Law

Prepares students for careers in the several fields of law. Some students may seek admission to law school to continue their preparation for the legal profession. Others may seek careers in law-related professions such as law enforcement, judicial administration and legal assistance.

Public Administration

Prepares students for careers in administrative work in government and related agencies and prepares students to enter graduate studies in the field of administration.

Teaching

Prepares students for careers as social studies teachers in junior and senior high schools. With additional coursework as prescribed by the University Center for Teacher Education, political science graduates who have completed this concentration may obtain a California single subject teaching credential in Government or in Social Sciences. For more information regarding teacher credential programs, please see the University Center for Teacher Education section.

Urban Studies

Prepares students for careers in broad fields of planning within government and related agencies and prepares students to enter advanced studies in the field of city and regional planning and urban administration.

Individualized Course of Study

Permits students with varying backgrounds and interests to pursue a course of study which meets their individual needs and interests. 27 units of coursework at the 300–400 level are selected by the student and approved by the student's academic adviser.

B.A. POLITICAL SCIENCE

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

MAJOR COURSES

	Units
POLS 100 Political Inquiry	4
POLS 105 Introduction to International Relations	4
POLS 204 Basic Concepts of Political Thought	4
POLS 305 Political Analysis.....	4
POLS 461 Senior Project.....	2
POLS 462 Senior Project.....	2
Political science electives (300–400 level)	17
Concentration courses or adviser approved electives (see below)	27
	<hr/> 64

SUPPORT COURSES

HIST 102 History of Western Civilization	3
HIST 103 History of Western Civilization	3
Geography elective (300–400 level)	3
Anthropology/Sociology elective (300–400 level)	3
	<hr/> 12

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level. Additional GEB courses are listed under Major and Support courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215 or 218 (A.4.)	
Area B:	18
Physical and life sciences electives (one each, one with lab) (B.1.)	
Mathematics elective (B.2.)	
Mathematics or statistics elective (B.2.)	
Mathematics, statistics or science elective (Area B)	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/SOC/WS elective (300–400 level) (D.4.b.)	

Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	6
Computer literacy elective (F.1.)	
Technology elective (300–400 level) (F.2.)	
Total	<hr/> 79

ELECTIVES	31
	<hr/> 186

CONCENTRATIONS**International Affairs Concentration**

POLS 312 International Politics	3
POLS 382 Comparative Politics	4
POLS 384 Politics of Developing Areas.....	3
POLS 411 Contemporary U.S. Foreign Policy	3
Adviser approved electives (4 units must be 300–400 level)	14
	<hr/> 27

Pre-Law Concentration

ENGL 302 Writing: Advanced Composition.....	4
POLS 321 American Constitutional Law	4
POLS 322 Civil Liberties.....	4
POLS 334 Jurisprudence	3
POLS 336 Judicial Process.....	4
Pre-Law electives (300–400 level).....	8
	<hr/> 27

Public Administration Concentration

POLS 314 Public Administration.....	4
POLS 340 Government Internship.....	4
POLS 401 State and Local Government	4
POLS 405 Politics of Finance and Planning	3
POLS 425 Public Policy Analysis	4
POLS 441 Administrative Theory and Behavior	4
POLS 442 Public Personnel Administration.....	4
	<hr/> 27

Teaching Concentration

POLS 301 California State and Local Politics	3
POLS 307 American Political Thought.....	3
POLS 336 Judicial Process	4
POLS 382 Comparative Politics.....	4
ECON 304 Comparative Economic Systems	3
GEOG 250 Physical Geography.....	3
HIST 101 History of Western Civilization.....	3
HIST 402 American Revolution.....	3
Adviser approved elective	1
	<hr/>
	27

Urban Studies Concentration

POLS 303 Minority Group Politics	3
POLS 380 Political Behavior.....	4
POLS 401 State and Local Government.....	4
POLS 425 Public Policy Analysis.....	4
Adviser approved electives (3 units must be 300–400 level).....	12
	<hr/>
	27

PUBLIC ADMINISTRATION MINOR

Students interested in public sector careers may enroll in the minor program in Public Administration. The minor consists of 28 units of coursework and involves a supervised internship experience in a governmental agency. Details are available from the Political Science Department.

	<i>Units</i>
Required courses	23
POLS 314 Public Administration (4)	
POLS 340 Government Internship (4)	
POLS 405 Politics of Finance and Planning (3)	
POLS 425 Public Policy Analysis (4)	
POLS 441 Administration Theory and Behavior (4)	
POLS 442 Public Personnel Administration (4)	
Electives.....	6
6 units of adviser approved electives.	
	<hr/>
	29

INTERNATIONAL RELATIONS MINOR

Students interested in adding a strong international dimension to their major field of study may enroll in the minor program in International Relations. The minor consists of coursework in three categories: required coursework, area of emphasis (Latin America, Middle East, Africa, Europe), and adviser approved electives. Details are available from the Political Science Department. At least 15 units must be at the 300–400 level.

	<i>Units</i>
Required courses	13
POLS 105 Introduction to International Relations (4)	
POLS 411 Contemporary U.S. Foreign Policy (3)	
ECON 325 Underdevelopment and Economic Growth (3) (D.4.b.)	
GEOG 308 Global Geography (3) (D.4.b.)	
Area of emphasis	9–12
Adviser approved electives	7–4
	<hr/>
	29

PSYCHOLOGY AND HUMAN DEVELOPMENT DEPARTMENT

Faculty Office Bldg. (47), Room 24
(805) 756-2033

Faculty

Department Head, Patrice L. Engle

Margaret M. Berrio	Ann Morgan
Robert L. Blodget	Linden L. Nelson
Shawn Burn	Marilynn F. Rice
Harry J. Busselen	Kathleen A. Ryan
Robert A. Christenson	Donald H. Ryujin
David L. Englund	Ned W. Schultz
Basil A. Fiorito	Michael J. Selby
Laura A. Freberg	Charles M. Slem
Laura M. King	W. Fred Stultz
Daniel J. Levi	Bette W. Tryon
J. Kelly Moreno	Debra Valencia-Laver

Programs

B.S. Human Development

with Concentrations in:

Applied Developmental Psychology
Applied Family Psychology
Applied Social Psychology
Early Childhood Education

M.S. Psychology

Gerontology Minor

Psychology Minor

The department consists of faculty with degrees in psychology, family studies, human development and education who direct programs leading to B.S. Human Development, M.S. Psychology, and minors in Psychology and Gerontology. In addition, courses are offered which fulfill general education requirements, support other programs and serve as a personal development resource for all university students. These courses are designed to acquaint students with the facts, theories and contemporary trends in psychology and human development and how these principles can be incorporated into a more meaningful understanding of oneself and of one's interactions with others. The department supports the concept of international education and encourages students to investigate opportunities for overseas study. For further information, see the Study Abroad programs.

B.S. PSYCHOLOGY

At the time the catalog went to press, a B.S. in Psychology and a revision of the B.S. in Human Development had been forwarded to the Trustees and the Chancellor's Office for approval. Please contact the department for the current status of these degree programs.

B.S. HUMAN DEVELOPMENT

Human Development majors study lifespan, human development, psychology, and research and intervention methods as preparation for work with children and adults. Students participate in department-operated infant, toddler, and preschool programs. They attend psychology laboratories and complete internships in area schools, organizations and agencies as part of the "learn by doing" educational process.

CONCENTRATIONS

Applied Developmental Psychology

Prepares students for careers in human service agencies, health care settings, and special needs programs. Students study the nature of human development throughout the life span and learn to use psychological and developmental principles to assess and analyze behavior and to implement behavior change. Students are prepared for graduate study in psychology and counseling.

Applied Family Psychology

Interdisciplinary study that provides knowledge and experience necessary for a variety of careers in family, social service and counseling-related agencies in the public and private sectors. Appropriate for students who wish to work in educational or helping agencies and who desire a family focus rather than a broad social science perspective. Students also pursue further graduate-level training in a variety of areas.

Applied Social Psychology

Methods and principles of social psychology relevant to occupations in business and industry, government agencies, and nonprofit organizations. Careers include research, evaluation of social intervention programs, management, consultation to business and government agencies, and social activism. In addition to the various areas of psychology, students are prepared for graduate study in human resources management, public administration, and related disciplines.

Early Childhood Education

Students selecting this concentration prepare for careers in preschool and elementary teaching, caregiving, and administrative positions with public or private institutions or for graduate work leading to college or university teaching and research positions. These graduates may plan for careers in programs that serve infants, preschool and school-age children.

PSYCHOLOGY MINOR

The Psychology minor provides students with a broad background in the principles of psychology in order to develop an appreciation of the human element in the world around them, complement their professional training, and enhance their personal development and interpersonal effectiveness. Students whose primary job responsibilities will require dealing with people should find employment opportunities increased and career advancement enhanced. Interested students are encouraged to contact the Psychology and Human Development Department for information and application forms.

Required courses *Units* 18-19

PSY 201/202 General Psychology (E.1.) (3)
 PSY 304 Physiological Psychology (E.2.) (3)
 PSY 305 Personality (3)
 PSY 405 Abnormal Psychology (3)
 ANT 360 Human Cultural Adaptation (D.4.b.) (3)
 or PSY 252 Social Psychology (4)
 STAT 211/217/321 (B.2.) (3)

Adviser approved PSY courses (200–400 level) 9-8
 At least 5 units must be upper division

 27
GERONTOLOGY MINOR AND CERTIFICATE

This is an interdisciplinary minor that prepares students in various majors whose careers will be directly or indirectly related to gerontology. The certificate program is available to upgrade the skills and increase the knowledge of persons already in the field of gerontology. Coursework includes the biological, psychological, and social aspects of aging; changing roles; stress related problems; and an understanding of the impact of an aging population on social, economic, and political institutions.

Among the requirements for admission to the program is a minimum GPA of 3.00. All applicants will be reviewed by a faculty committee.

Required core *Units* 18

BIO 330 Biology of Aging (3)
 PE 408 Exercise and Health Promotion for Seniors (3)
 PSY 318 Psychology of Aging (3)
 SOC 326 Sociology of Aging (3)
 FSN 315 Nutrition in Aging (3)
 PSY 310 Death, Dying and Bereavement (3)

Adviser approved elective 3
 May be selected from: HD 308, POLS 425, PSY 317, PSY 459

Gerontology-related Fieldwork 3
 May be fulfilled as an elective in the student's major or it may be challenged due to previous work.

 24
RELATED MINORS

Integrative Technology Minor: an interdisciplinary program with faculty involvement from the departments of Industrial and Manufacturing Engineering, Industrial Technology, and Psychology and Human Development departments. The minor is for non-engineering students who wish to pursue their professional career in a corporate setting and want to learn more about the impact of technology. For more information, see the Industrial Technology Department.

Values, Technology and Society Minor: an interdisciplinary program which increases the student's understanding of how technology shapes and influences modern life. The minor is available to students throughout the University regardless of students' technical backgrounds. For more information, see the College of Liberal Arts section of this catalog, or contact Dan Levy, Psychology and Human Development Department.

B.S. HUMAN DEVELOPMENT

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

* = Courses satisfy GEB

HD 102 Human Development: Introduction to Issues and Applications	3
HD 130 Supervised Study of Children	4
HD 203 Family Development	3
HD 230/PSY 351/PSY 429	4
HD 306 Adolescence	3
HD 308 Adulthood	3
HD 330 Supervised Internship or PSY 453 Supervised Fieldwork	4/6
HD 430 Advanced Internship or PSY 454 Supervised Fieldwork	6
HD 461, 462 Senior Project (2) (2) or PSY 461, 462 Senior Project (1) (3)	4
PSY 201/PSY 202 General Psychology (E.1.)*	3
PSY 252 Social Psychology	4
PSY 254 Family Psychology	4
PSY 256 Developmental Psychology or HD 209 Early Development	4/5
PSY 305 Personality	3
PSY 323 The Helping Relationship	4
PSY 329 Research Methods in Psychology and Human Development	5
PSY 405 Abnormal Psychology or PSY 456 Behavior Disorders in Children	3
PSY 458 Learning	3
Concentration courses (see below)	35-37

102-107

SUPPORT COURSES

* = Courses satisfy GEB

BIO 302 Human Genetics (B.1.b.)*	3
ES (any course)	3
FSN 210 Nutrition (E.2.)* or PSY 304 Physiological Psychology (E.2.)*	3
STAT 211/217/251/321 (B.2.)*	3/4

12/13

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.

Additional GEB courses are listed under Major and Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/202 (A.3.)	
ENGL 215/218 (A.4.)	
Area B:	12
A minimum of 18 units is required; 6 of the units are in Support.	
Physical and life sciences electives (one each, one with lab) (B.1.)	
Life science (B.1.b.)* see Support Courses	
Mathematics elective (B.2.)	
Statistics(B.2.)* see Support Courses	
Mathematics, statistics or science elective (Area B)	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	0
A minimum of 5 units is required; 5 of the units are in Major and Support	
Psychology (E.1.)* see Major Courses	
(E.2.)* see Support Courses	
Area F:	6
Computer literacy elective (F.1.)	
Technology elective (300–400 level) (F.2.)	
Total	68
A minimum of 79 units is required; 11 of the units are in Major and Support	

ELECTIVES..... 16-10

198

CONCENTRATIONS (select one)**Applied Developmental Psychology Concentration**

PSY 419 Development of Self & Individuality	3
PSY 420 Social and Emotional Development.....	3
PSY 421 Cognitive Development.....	3
PSY 432 Psychological Testing.....	3
PSY 459 Lifespan Theories	3
PSY 465 Cross-Cultural Issues in Psychology	3
Adviser approved electives.....	18
	<hr/>
	36

Applied Social Psychology Concentration

PSY 302 Behavior in Organizations	3
PSY 311 Environmental Psychology	3
PSY 317 Psychology of Stress	3
PSY 359 Applied Psychology Research Methods	4
PSY 432 Psychological Testing.....	3
PSY 496 Applied Social Psychology.....	4
SOC 330/POLS 380/MGT 314	3
Adviser approved electives.....	12
	<hr/>
	35

Applied Family Psychology Concentration

PSY 303 Family Interaction	3
PSY 380 Issues in Family Psychology: Past, Present, Future	4
PSY 450 Family Therapy and Crisis Intervention.....	4
PSY 481 Family Theory	3
Adviser approved concentration electives	23
	<hr/>
	37

Early Childhood Education Concentration

HD 128 Program Planning for Infants and Toddlers ..	3
HD 211 Early Childhood Learning: Applications for the Preoperational Period.....	5
HD 311 Early Childhood Learning: Applications for the Transitional Period	5
HD 324 Guiding Young Children	3
HD 401 Perspectives on Childhood Education.....	3
HD 404 Administration of Children's Programs	3
PSY 421 Cognitive Development.....	3
FSN 310 Maternal and Child Nutrition	3
PE 280 First Aid and CPR.....	3
Select two courses from the following:	6
ART 104, ENGL 260, MU 100, PSC 103, TH 380, HD 405, 413, DANC 135, SPC 302, 303, 320, MATH 327, 328, ENGL 302	
	<hr/>
	37

MASTER OF SCIENCE DEGREE IN PSYCHOLOGY

General Characteristics

The Master of Science in Psychology is a 90-quarter unit professional degree program designed for persons who desire to practice in the field of clinical/counseling psychology. The primary purpose of the program is to develop mastery of a substantial body of knowledge and skills to prepare highly qualified masters-level professionals to clinically counsel individuals, couples, families, children and groups. The program places a heavy emphasis on clinical skill training and applied experience which begins early in the program and culminates with an intensive supervised internship in a community mental health setting.

Admission to the Program

In addition to the general requirements of the University, specific requirements for admission to classified graduate standing are:

1. an acceptable baccalaureate degree from an institution accredited by a regional association;
2. a minimum grade point average of 3.0 in the last 90 quarter units (60 semester units) attempted;
3. satisfactory performance on the General Tests (Verbal, Quantitative, Analytical) of the Graduate Record Examination (GRE); the GRE Advanced Test in Psychology is not required;
4. four letters of recommendation;
5. autobiographical information;
6. a screening interview.

Related work or volunteer experience is highly desirable. Candidates should request from the department a supplemental application packet for admission to the program.

Prerequisites

Prerequisites are coursework in abnormal psychology, behavioral effects of psychoactive drugs, behavior disorders in children, physiological psychology, personality, psychological testing, introductory statistics, and research methods in psychology (or related discipline). Candidates who have not completed such courses will not be denied admission to the university, but will be required to remove deficiencies within three quarters of admission.

Classified Standing

For admission as a classified graduate student, a student shall have a minimum grade point average of 3.0 in the last 90 quarter units (60 semester units) attempted and shall have earned an acceptable baccalaureate degree from an institution accredited by a regional association. Additionally, the student must have satisfactorily met the professional, personal, scholastic, and other standards for graduate study, including qualifying examinations, as the appropriate university authorities may prescribe. Only those applicants who show promise of success and fitness will be admitted, and only those who continue to demonstrate a satisfactory level of scholastic competence and who possess appropriate personal qualities will be eligible to continue in the program.

Conditionally Classified Standing

The student may enroll in a graduate degree curriculum if in the opinion of the M.S. Program Committee the student can remedy any deficiencies by additional preparation.

Advancement to Candidacy

Advancement to master's degree candidacy requires completion of a minimum of 30 quarter units of required courses in residence, specified in a formal program of study, with a minimum grade point average of 3.0 and the formal recommendation of the M.S. Program Committee. Students must maintain a minimum GPA of 3.0 in all coursework completed subsequent to admission to the program.

Continuation in the Program

The student must maintain a grade point average of 3.0 (B) or better in all courses taken subsequent to program admission. Calculation of the grade point average will include all grades, though only the units in courses with grades of A, B, or C will be counted to satisfy requirements for the degree. Required courses with a grade of D or F must be repeated.

All candidates must meet the current Graduation Writing Requirement.

Forty-five quarter units must be completed in residence. Transfer credits will be allowed if acceptable for master's degree credit at the offering institution and approved by the M.S. Program Committee,

The Master of Science degree in Psychology requires a culminating experience that includes either the completion of a thesis/project or the supervised comprehensives. Each candidate must file a formal program of study by the end of the first quarter as a classified graduate student. The student must complete one quarter in residence before applying for formal admission into the MS in Psychology, MFCC educational verification emphasis. The professional and personal growth of each graduate student is of major importance; consequently, candidates will be encouraged to seek the experience of personal therapy. Students must be

very aware of course prerequisites and check the catalog carefully to assure enrollment in required courses.

MFCC Licensing

The Department does not issue licenses but the Master of Science in Psychology is designed to meet the educational requirements for the Marriage, Family and Child Counseling (MFCC) license in the State of California. Students seeking verification of these educational requirements must complete the MFCC Emphasis which adds 6-9 units to the 90-unit M.S. degree program. Students are advised to acquire and read the laws governing MFCC licensure from the Board of Behavioral Science Examiners, 400 R Street, Suite 3150, Sacramento, CA 95814-6240. See the program coordinator for the procedure required for application for this license. State documents must be filed by the applicant within 30 days of program commencement and graduation.

Grades: If a candidate for University recommendation for MFCC licensure has more than one grade of C or lower among the courses to be verified for the Board of Behavioral Sciences, that form will not be approved by the Chief Academic Officer Designee of Cal Poly.

Field Experience: Field experience or internship courses represent the student's demonstration of the clinical skills basic to marriage, family and child counseling. A student who receives a grade of C or lower in field experience is on probation regarding continuation in the MFCC Emphasis. A second grade of C or lower will disqualify the student for continuation in the MFCC Emphasis and ultimate University recommendation for the license. Further candidates may be disqualified from this program for actions judged by the M.S. Program Committee to reflect unethical, unprofessional or incompetent behavior or clinical skills.

CURRICULUM FOR M.S. PSYCHOLOGY

	<i>Units</i>
PSY 450 Family Therapy and Crisis Intervention	4
PSY 459 Lifespan Theories	3
PSY 504 Psychoneurology and Pharmacology.....	3
EDUC/PSY 555 Counseling and Communication	4
EDUC 556 Ethnic Counseling	4
EDUC/PSY 560 Counseling Theories and Assessment	4
EDUC/PSY 561 Group Counseling	3
PSY 564 Ethics and the Law: MFC Counseling	3
PSY 565 Diagnosis/Treatment Psychopathology	4
PSY 566 Group Therapy	3
PSY 568 Advanced Psychotherapies	3
¹ PSY 569 Counseling Clinic Practicum	6
PSY 574 Applied Psychological Testing	3
¹ PSY 573 Field Experience: Counseling or PSY 576 Field Experience: Marital and Family Counseling	12
PSY 585 Research Methods for Counseling Psychology.....	4
PSY 590 Research Applications in Psychology and Human Services	4
² PSY 599 Thesis/Project (3) or 3 units of approved electives <i>and</i> written comprehensive examination	3
³ Adviser approved electives	20
	<hr/> 90

MFCC Emphasis

Students who are interested in pursuing the MFCC emphasis will be required to complete the following courses as elective units to meet requirements prescribed by California legislation for MFCC licensure:

PSY 569 Counseling Clinic Practicum (6)
 PSY 571 Advanced Marital and Family Therapy (4)
 PSY 572 Child and Adolescent Therapy (4)
 PSY 575 Sexual Dysfunction Therapy (3)
 PSY 576 Field Experience: Marital and Family
 Counseling (12)

¹ Additional fieldwork will be required to meet on-site requirements of MFCC educational verification.

² Must register for thesis/project credit each quarter of advisement.

³ Students seeking the MFCC emphasis within the M.S. in Psychology must meet the content area requirements prescribed by California legislation (see adviser).

SOCIAL SCIENCES DEPARTMENT

Faculty Office Bldg. (47), Room 13-D
(805) 756-2260

Faculty

Department Chair, Harold R. Kerbo

Anthropology

Barbara E. Cook
Robert L. Hoover
Patrick C. McKim

Geography

Donald R. Floyd
William L. Preston
George J. Suchand
Calvin H. Wilvert

Sociology

James W. Coleman
Warren W. DeLey
John A. McKinstry
Barbara L. Mori
Leo W. Pinard II
Richard A. Shaffer

Programs

B.S. Social Sciences

Students may select Individualized Course of Study or a Concentration in:

Criminal Justice
Cross-Cultural Studies
Organizations
Social Sciences (Teaching)
Social Services

Anthropology-Geography Minor

The Social Sciences Department provides a broadly based, multicultural and multidisciplinary perspective on humanity, society and the environment. Since we offer courses in anthropology, geography and sociology, our students have an opportunity to examine human experience from a greater variety of viewpoints than can be had in any other department at Cal Poly. In anthropology, we address humanity in both the biological and cultural dimensions, emphasizing the diversity of our species in the present as well as the past. Geography bridges the gap between the physical and social sciences. It focuses on regional patterns and linkages between culture and natural environments. In sociology, we explore the nature and dynamics of human society and the interrelationship between individuals and their social groups.

The world of the 21st century will demand a greater understanding than ever of the complexity and diversity of the world's peoples and their problems. The Social Sciences Department serves the University by providing several important offerings in general education. Our primary mission in the general education program is to provide some essential tools of national and global citizenship. Some of these courses focus on American society, emphasizing issues of class, race, ethnicity and gender. Other courses have an

international orientation, dealing with both the past and present diversity of the world's societies, economies, politics, religions, and physical environments. We also offer courses that stress environmental problems on both local and global levels.

The occupational objectives of the department are to prepare students for those numerous entry jobs in government and business which require a bachelor's degree in the social sciences, and to educate those who expect to teach in secondary or elementary schools.

Students with majors in fields other than the social sciences may select courses which will aid in qualifying them for a variety of occupations. The department offers an Anthropology-Geography Minor.

The department offers the degree of Bachelor of Science in Social Sciences. This degree allows the student to choose among concentrations leading to different careers.

CURRICULAR CONCENTRATIONS

Criminal Justice

Prepares students for careers in law, law enforcement, corrections, detention, probation, parole and other criminal justice agencies.

Cross-Cultural Studies

Prepares students for careers in a wide range of cross-cultural contexts: international development agencies, the public health field, intercultural education, plus numerous careers overseas in private industries.

Individualized Course of Study

Provides students the opportunity to pursue a course of study which meets their individual needs and interests. It consists of 27 units at the 300–400 level. The student selects the courses in consultation with advising faculty and provides a written justification for the courses and the way they constitute a cohesive, integrated study. The list of courses is a contract between the student and the Department.

Organizations

Students learn to apply the general principles of human behavior to the understanding of modern organizations. It prepares them for careers in either business or government organizations.

Social Services

Provides students the general principles of human social behavior and specialized professional courses to prepare for careers in the helping professions such as social work and counseling.

Teaching

With additional coursework as prescribed by the University Center for Teacher Education students may pursue coursework leading to the Multiple Subject Credential for elementary school teachers or the Single Subject Credential for secondary school social science teachers of history, geography, political science and economics. Certain courses apply toward a "waiver" program which eliminates the National Teacher Examination requirement for the Single Subject credential. For more information regarding teacher credential programs, please see the University Center for Teacher Education section.

OTHER CONCENTRATIONS AVAILABLE

The following concentrations outside the Social Sciences Department are also offered with prior consultation and approval of the Social Sciences Department and the department offering the concentration: Public Administration, Pre-Law, International Affairs or Urban Studies (Political Science Department), Human Resources Management, Management, or International Business Management (College of Business).

ANTHROPOLOGY-GEOGRAPHY MINOR

The Anthropology-Geography Minor provides the broadest possible spatial and cultural knowledge of our world. The 30-unit program consists of 12 units of required core courses, in addition to others that allow the student maximum flexibility in tailoring training to a wide variety of specific occupational needs. Many majors may find this minor of special interest, especially those planning teaching careers in History, Political Science, and Liberal Studies, or those interested in international aspects of agriculture, economics, or business.

At least 15 units must be selected from upper division courses, and at least two foundation courses must be completed before proceeding to upper division courses.

	<i>Units</i>
<i>Foundation Courses</i>	12
ANT 201 Cultural Anthropology (D.4.a.) (3)	
ANT 203 Physical Anthropology (3)	
GEOG 150 Human Geography (D.4.a.) (3)	
GEOG 250 Physical Geography (3)	
<i>Global Courses</i> (select 2)	6
ANT 202 World Prehistory (3)	
ANT 325 Material Culture (3)	
ANT 341 Comparative Societies (3)	
GEOG 305 Political Geography (3)	

GEOG 308 Global Geography (D.4.b.) (3)
GEOG 315 Resource Utilization (3)

<i>Ecological Courses</i> (select 2)	6
ANT 360 Human Cultural Adaptations (D.4.b.) (3)	
GEOG 215 Human Impact on the Earth (3)	
GEOG 325 Climate and Humanity (3)	
AGB 307 World Agricultural Resources (3)	
<i>Area Courses</i> (select 1)	3
ANT 450 Area Studies (3)	
GEOG 340 California Geography (3)	
GEOG 350 Geography of the USA (3)	
GEOG 401 Area Geography (3)	
SOC 350 Sociology of Japan (3)	
<i>Special Skills</i> (select 1)	3
ANT 310 California Archaeology (3)	
ANT 333 Language and Culture (3)	
ANT 401 Culture and Health (3)	
ANT 420 Development Anthropology (3)	
ANT 444 Sex, Death and Human Nature (3)	
GEOG 310 Urban Geography (3)	
AE 345 Aerial Photogrammetry and Remote Sensing (3)	
MSC 111 Orienteering (3)	

B.S. SOCIAL SCIENCES

Courses are displayed by Major, Support, Concentration, General Education and Breadth, and Electives.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements

	Units
ANT 201 Cultural Anthropology (D.4.a.)*	3
ANT 202 World Prehistory	3
ANT 203 Physical Anthropology	3
Anthropology electives (300–400 level)	6
GEOG 150 Human Geography	3
GEOG 215 Human Impact on the Earth	3
GEOG 250 Physical Geography	3
Geography electives (300–400 level)	6
SOC 105 Introduction to Sociology	3
SOC 106 Social Problems	3
SOC 323 Social Stratification	3
SOC 333 Social Research Methods I	3
SOC 334 Social Research Methods II	3
SOC 421 Social Theory	3
SOCS 461 Senior Project	2
SOCS 462 Senior Project	2
Sociology electives (300–400 level)	6
Concentration courses or individualized course of study (see below)	27
	<hr/> 85

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

History elective (300–400 level)	3
Political science elective (300–400 level)	3
STAT 211 Elementary Probability and Statistics (B.2.)*	3
	<hr/> 9

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level. Additional GEB courses are listed under Major and Support courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215 or 218 (A.4.)	
Area B:	15
A minimum of 18 units is required; 3 of the units are in Support	
Physical and life sciences electives (one each, one with lab) (B.1.)	
Mathematics elective (B.2.)	
Statistics (B.2.)* see Support Courses	
Mathematics, statistics or science elective (Area B)	

Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	15
A minimum of 18 units is required; 3 of the units are in Major	
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
(D.4.a.)* see Major Courses	
BUS/ECON/POLS/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	6
Computer literacy elective (F.1.)	
Technology elective (300–400 level) (F.2.)	
Total	<hr/> 73
A minimum of 79 units is required; 6 of the units are in Major and Support	
ELECTIVES	19
	<hr/> 186

SELECT CONCENTRATION OR INDIVIDUALIZED COURSE OF STUDY (select one)**Criminal Justice Concentration**

SOC 316 American Ethnic Minorities	3
SOC 402 Crime and Delinquency	3
SOC 412 Criminal Justice	3
SOC 413 Methods of Social Work	3
SOCS 440 Internship	3
Adviser approved electives	12
	<hr/> 27

Cross-Cultural Studies Concentration

Required courses (12 units)

ANT 341 Comparative Societies	3
ANT 360 Human Cultural Adaptation	3
GEOG 308 Global Geography	3
SOC 309 The World System and Its Problems	3
Development courses to be selected from	6
ANT 325, ANT 420, GEOG 315	
Problems and Issues courses to be selected from	6
ANT 401, GEOG 305, GEOG 325, SOC 315	
Regions and Applications	
courses to be selected from approved list. See adviser	3
	<hr/> 27

Organizations Concentration

Select from the following courses: 20–21

SOC 310 Self, Organizations and Society (3)

SOC 350 Social Organization in Modern Japan (3)

SOC 395 Sociology of Complex Organizations (3)

SOCS 440 Internship (3)

MGT 312 Organization and Mgmt. Theory (4)

MGT 314 Human Resource Management (4)

MGT 317 Organizational Behavior (4) or

PSY 302 Behavior in Organizations (3)

Adviser approved electives 7–6

27**Social Services Concentration**

SOC 301 Social Work in the U.S.A. 3

SOC 302 Social Welfare Institutions 3

SOC 344 Sociology of Poverty 3

SOC 413 Methods of Social Work 3

SOCS 440 Internship 6

Adviser approved electives 9

27**Teaching Concentration**

GEOG 340 Geography of California 3

GEOG 350 Geography of the United States 3

SOC 316 American Ethnic Minorities 3

SOCS 424 Organizing and Teaching Social Sciences 3

SOCS 440 Internship or

EDUC 300 Intr. Teaching Profession 3

HIST 101, HIST 102, HIST 103 History of

Western Civilization 3,3,3

HIST 385 Topics in California History 3

27**Individualized Course of Study** 27

SPEECH COMMUNICATION DEPARTMENT

Faculty Office Bldg. (47), Room 33
(805) 756-2553

Faculty

Department Chair, Raymond F. Zeuschner

James R. Conway	Lorraine D. Jackson
Bernard K. Duffy	Steven McDermott
Susan Duffy	Alexis S. Olds
Michael L. Fahs	Harry Sharp, Jr.
David Henry	Terrence C. Winebrenner

Programs

B.A. Speech Communication

Speech Communication Minor

Understanding the process of communication is no less important in today's Information Age than it was during the Golden Age of Athens, when skill in oral communication determined one's success in life. The study of speech as a means of influence, entertainment, and information was at the foundation of Western Civilization in Classical Greece and Rome. Isocrates and Cicero were among those who credited speech with the development of civilization and culture. A course of study in speech communication, always one that required a knowledge of many cognate fields like psychology and logic, is still interdisciplinary in nature. Faculty in speech communication teach aesthetic, historical, critical and empirical methods for understanding communication.

The aims of the discipline are both conceptual and practical. The study of communication embodies the concerns of rhetoric, one of the three original liberal arts. In broad terms, students who enroll in a liberal arts curriculum do so to develop the ability to analyze and reason critically, write and speak effectively, and appreciate the influences of culture upon their lives. The first goal of the department is to advance these objectives.

Courses in the modern discipline of speech communication focus on the history and theory of communication. The field embraces communication in all contexts: political, organizational, debate, small group, intercultural, instructional, mass media, and performance of literature. The emphasis on developing theoretical insights unites these various fields.

The department offers fully articulated major and minor programs. Through the use of adviser approved electives, the major can be shaped to assist students in preparing for their educational and career objectives. Students use a speech

communication major to prepare for careers in business, advertising and public relations, theatre, law, education, the mass media, and the clergy. In addition to providing students with an option to select from a broad range of internships and the opportunity to participate in the Teaching Credential Program, the department houses an extensive program in competitive debate and speaking. It also offers individual and sequenced courses to develop practical skills in oral composition, critical thinking, and effective human communication, as well as general education courses in the history and theory of speech communication.

SPEECH COMMUNICATION MINOR

A 25-unit minor is available for students who desire documented competency in Speech Communication. After completing the core courses listed below, students may select the remainder of their courses from an approved list. Copies of the list and further information and application forms are available in the Speech Communication Department office.

	Units
Required courses (15)	
SPC 201 Public Speaking or	
SPC 202 Principles of Speech	
Communication (A.3.)	3
SPC 212 Interpersonal Communication	4
SPC 312 Communication Theory	4
SPC 330 Classical Rhetorical Theory or	
SPC 331 Political Advocacy and Contemporary	
Rhetoric (C.3.)	4
Electives	10
10 units of Speech Communication of which at least	
8 units must be 300–400 level.	
	25

B.A. SPEECH COMMUNICATION

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

MAJOR COURSES

	Units
SPC 101 Introduction to Speech Communication	1
SPC 212 Interpersonal Communication	4
SPC 213 Organizational Communication	4
SPC 217 Small Group Communication	4
SPC 250 Forensic Activity	1
SPC 305 Performance of Literature	4
SPC 312 Communication Theory	4
SPC 322 Persuasion	4
SPC 330 Classical Rhetorical Theory	4
SPC 350 Advanced Forensic Activity	2
SPC 411 Communication Research	4
SPC 430 Rhetorical Criticism	4
SPC 460 Undergraduate Seminar	1
SPC 461 Senior Project	3
Speech Communication electives (300–400 level) to be selected with adviser approval	16
	<hr/> 60

SUPPORT COURSES

ENGL 302 Writing: Advanced Composition or score of 10 or better on Writing Proficiency Exam ..	4
HIST 101 History of Western Civilization	3
HIST 102 History of Western Civilization	3
HIST 103 History of Western Civilization	3
	<hr/> 13

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.

Additional GEB courses are listed under Major and Support courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215 or 218 (A.4.)	
Area B:	18
Physical and life sciences electives (one each, one with lab) (B.1.)	
Mathematics elective (B.2.)	
Mathematics or statistics elective (B.2.)	
Mathematics, statistics or science elective (Area B)	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	

Area D:	18
HIST 204 (D.1.), POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	6
Computer literacy elective (F.1.)	
Technology elective (300–400 level) (F.2.)	
Total	<hr/> 79
ELECTIVES	34
	<hr/> <hr/> 186

THEATRE AND DANCE DEPARTMENT

Davidson Music Center (45), Room 104
(805) 756-1465

Faculty

Department Head, Alvin J. Schnupp

Maria L. Junco Moon Ja Minn Suhr
Michael R. Malkin David S. Thayer

Programs

Dance Minor

Theatre Minor

The courses offered by the Theatre and Dance Department provide students with a well-balanced program of studies, useful as a solid foundation on which to build further graduate or professional studies, or as a way of expressing themselves creatively.

In the dance program, a full range of studio dance courses—ballet, modern, jazz, folk, social—is available. Courses such as Dance Appreciation, Dance History, Dance Notation and Dance Production, as well as courses designed for future teachers of dance (primarily in elementary or secondary schools) are also offered.

In theatre, the major aspects of the discipline are covered—technical theatre, design, acting and directing. General Education and Breadth courses are available for the inquiring student in Introduction to Theatre and for the more advanced student in Theatre History and Literature. Courses in Children's Theatre are particularly designed for elementary or secondary teachers.

The department also acts as a cultural focus for the campus and community with its three mainstage dramatic productions and, since 1970, its annual Orchesis dance concert. Cal Poly students have the opportunity to participate in these productions through auditioning, volunteering, or coursework. Recent stage productions have included *Censored*, *Brighton Beach Memoirs*, *You're a Good Man, Charlie Brown*, and four world premieres. The department frequently sponsors guest lecturers and student-directed productions. Minors are offered in both Dance and Theatre.

DANCE MINOR

The Dance Minor consists of 26 units designed to provide the student with a well-balanced program in the art and education of dance.

Admission to the minor is contingent upon a departmental interview and review. Students must have more than a 2.0 GPA.

	Units
Core courses (19)	
DANC 134 Beginning Social Dance	2
DANC 221 Dance Appreciation (C.2.)	3
DANC 231 Intermediate Ballet	2
DANC 232 Intermediate Modern Dance	2
DANC 321 Dance History (C.3.)	3
DANC 340 Dance Improvisation and Composition ..	3
DANC 381 Methods of Teaching Dance	4
Elective courses to be selected from:	7
DANC 135 International Folk Dance (1)	
DANC 211 Dance Fundamentals (2)	
DANC 233 Intermediate Jazz (2)	
DANC 234 Intermediate Social Dance (2)	
DANC 320 Dance Notation (3)	
DANC 345 Choreography (3–12)	
DANC 346 Dance Production (3–12)	
DANC 400 Special Problems for	
Undergraduates (1-2)	
DANC 470 Selected Advanced Topic (1-3)	
DANC 471 Selected Advanced Laboratory (1-3)	
	—
	26

THEATRE MINOR

The Theatre Minor requires 28 units designed to provide the student with a sound foundation in the major aspects of theatre. This program assures each student of a balanced program in the major areas of theatre, and it allows for a degree of specialization in an area of the student's choice. Students should discuss their interests with department faculty.

Admission to the minor is contingent upon a departmental interview and review. Students must have more than a 2.0 GPA.

	<i>Units</i>
Core courses (18-21)	
TH 210 Introduction to Theatre (C.2.)	3
TH 327 Theatre History and Literature (C.3.)	3
TH 328 Theatre History and Literature (C.3.)	3
TH 330 Stagecraft	3-9
TH 340 Acting	3
TH 430 Introduction to Stage Design: Scenery	3
Elective courses to be selected from the following	10-4
TH 342 Directing (3)	
TH 345 Rehearsal and Performance (3-9)	
TH 350 Advanced Playwriting (3)	
TH 380 Children's Drama (3)	
TH 432 Introduction to Stage Design: Costume (3)	
TH 434 Introduction to Stage Design: Lighting and Sound (3)	
TH 470 Selected Advanced Topics (1-3)	—
	28



SCIENCE and POLITICS

Physics professor David Hafemeister and Ronald Lehman, former chief U.S. negotiator on the START I treaty, speak with physics student, Craig Kent, and political science senior, Laura Crystle. The Physics Department sponsored a speakers series, drawing upon Hafemeister's connections he developed as a staffer for the Senate Foreign Relations Committee. Students were given the opportunity to hear the reality on nuclear disarmament and related issues from experts. *Photo by Marty Scoduto.*

College

of

SCIENCE

and

MATHEMATICS

College of Science and Mathematics

**Faculty Offices East (25), Room 229
(805) 756-2226**

Philip S. Bailey, Dean

Department:	Program:
	Biotechnology: Minor
Biological Sciences	Biological Sciences: BS, MS Ecology and Systematic Biology: BS Microbiology: BS
Chemistry	Biochemistry Chemistry
Mathematics	Mathematics: BS, MS, Minor
Physical Education and Kinesiology	Physical Education: BS, MS
Physics	Physical Science: BS Physics: BS
Statistics	Statistics: BS, Minor

In cooperation with the University Center for Teacher Education the College offers programs leading to teaching credentials in Biological Sciences, Mathematics, Physical Education and Physical Sciences.

The College of Science and Mathematics has two equally important roles: (1) to provide support and breadth courses in science and mathematics for all students within the university and (2) to provide specialized coursework for students enrolled in the College's undergraduate, graduate, and minor programs.

The College is, as is all of Cal Poly, dedicated to undergraduate instruction. Resources are channeled for this purpose in support of the "learn by doing" approach of this university. In laboratory, students have daily access to modern instrumentation. Classroom instruction is done in relatively small classes so that a personal approach by instructors is possible. Because of its large role in offering support courses to the rest of the university, the number of faculty in each department is relatively large and favors student-faculty interaction, both academically and socially.

STUDENT SERVICES

The College Office acts on various student-initiated petitions (change of major, curriculum substitutions, withdrawal from the university). In addition, the Dean's Office has the dual function of counseling those on academic probation and

notifying those undergraduate students who are eligible each quarter for the Dean's Honor List.

FACULTY ADVISING

Faculty members take an active role in academic and career advising. Students are encouraged by all and required by some departments to obtain academic advising prior to registration each quarter. The adviser-student relationship becomes important especially when the student needs a letter of reference for a potential employer or needs career advice.

ADVISING CENTER

Science North (53), Room 219
(805) 756-2615

A College advising office supplements the role of the faculty adviser. The Advising Center staff provide information on College programs, coordinates public relations efforts, distributes registration materials, and furnishes information on academic and career advising.

APPLYING TO GRADUATE COLLEGE

College of Science and Mathematics faculty have earned master's and doctoral degrees from a wide variety of universities and are excellent sources for information and advice about graduate programs, prerequisites and application procedures. Applications to graduate programs should be made in the fall for admission to the following fall term. The Graduate Record Exam (GRE) should be taken early in the application cycle. Generally, two or more letters of reference from faculty are required. Most Ph.D. granting institutions offer financial support in the form of teaching assistantships and research fellowships.

HEALTH SCIENCES PREPROFESSIONAL PREPARATION

Students applying to professional schools in the health sciences have need of current information in order to be competitive for admission. A Health Professions Guidance and Evaluation Committee has been established to assist students, regardless of their major, in all phases of their preparation. Please see Health Professions for more information.

BIOTECHNOLOGY MINOR

The Biotechnology Minor consists of a core of required courses and restricted elective courses. Advising for students in the Biotechnology minor will take place in the student's major department, including selection of restricted electives and preparation of an agreement form listing specific courses to satisfy the requirements for the minor.

Biological Sciences students preparing for the minor should take CHEM 316, 317, and 371 to fulfill the organic chemistry and biochemistry requirements in their major.

Biochemistry students preparing for the minor should take BACT 221 and BIO 303 as part of the General Education and Breadth science electives in their major.

Note: Courses listed in the major column of the Curriculum Evaluation Sheet are not eligible to satisfy the requirements for the minor.

	<i>Units</i>
Core courses (14-15)	
BIO 375/CHEM 375 Molecular Biology Laboratory...	2
BIO 475/CHEM 475 Tissue Culture Techniques	4
BIO 304 Molecular Genetics or CHEM 373 Molecular Biology	3
CHEM 473 Immunochemistry or ZOO 426 Serology and Immunology	3-4
CHEM 474 Protein Laboratory Techniques	2

Restricted electives 10-9

Biochemistry Majors

To be selected from the following. Some of the prerequisites may be waived or substituted with approval of the instructor and adviser. With adviser approval, 3 units may be chosen from other courses.
BACT 333, 402, 403, 423, 424; BIO 311, 322, 323, 324, 426; BOT 450; CHEM 477, 439

Biological Science Majors

To be selected from the following. Select at least one course from Group A and one from Group B.

Group A:

BIO 321, 322, 323, 324, 426; BOT 450,
CHEM 374

Group B:

BACT 333, 402, 403, 423, : BIO 311;
CHEM 331, 372, 477; ZOO 433

Microbiology Majors

To be selected from the following list.

BACT 333, 403, 342; BIO 311, 321, 322, 323, 324;
BIO 426; BOT 450; CHEM 331, 371, 372, 374,
477, 439

BIOLOGICAL SCIENCES DEPARTMENT

Fisher Science Hall (33), Room 273
(805) 756-2788

Faculty

Department Chair, V. L. Holland

Frederick P. Andoli	David J. Keil
Leslie S. Bowker	Anthony E. Knable
Robert J. Brown	George N. Knecht
Raul J. Cano	Richard J. Krejsa
Jaime S. Colomé	A. Mark Kubinski
Alan F. Cooper	Kingston L. Leong
Alvin A. DeJong	Royden Nakamura
Douglas D. Donaldson	Maria E. Ortiz
Harry L. Fierstine	Lee R. Parker
Dennis F. Frey	Elizabeth K. Perryman
Roger D. Gambs	Thomas L. Richards
David V. Grady	Rhonda L. Riggins
Michael T. Hanson	Dirk R. Walters
Dennis N. Homan	Archie M. Waterbury
Peter Jankay	Michael A. Yoshimura
Eric V. Johnson	

Programs

B.S. Biological Sciences

Students may select Individualized Course of Study or a Concentration in:
Anatomy-Physiology
Biology

B.S. Ecology and Systematic Biology

with Concentrations in:
Ecology
Marine Biology and Fisheries
Systematics
Wildlife Biology

B.S. Microbiology

M.S. Biological Sciences

The department offers complete undergraduate programs leading to Bachelor of Science degrees in Biological Sciences, Ecology and Systematic Biology, and Microbiology. For qualified students, a graduate program is available leading to the Master of Science degree. In addition, courses are offered to satisfy biology requirements in other academic majors.

The department is housed in modern facilities equipped with up-to-date instrumentation. Cal Poly's geographical setting offers unusual opportunities for studying representative plants and animals of both Northern and Southern California.

Graduates of the various programs enter fields in teaching; medical and biological laboratory technology; public health; wildlife management; agriculture; industry; and private, state and national park and forest services. A significant number enter graduate or professional schools for advanced study of botany, entomology, microbiology, plant pathology, zoology, marine sciences, veterinary science, medicine and dentistry. The department offers courses required for preprofessional training in medicine and paramedical fields. In the teaching area, all state requirements may be met for an academic major in biological sciences leading to credentials in secondary teaching.

The department supports the concept of international education and encourages students to investigate opportunities for overseas study. For further information, see Study Abroad Programs.

BIOLOGICAL SCIENCES MAJOR

With the several curricular concentrations described below, this degree offers students a broad education in biology. It is suitable for preprofessional preparation in the bio-medical fields, as a base for work toward postbaccalaureate studies, and for technical competency in the concentrations offered.

CURRICULAR CONCENTRATIONS

Anatomy-Physiology

This concentration is designed for students who are interested in the biological sciences with an emphasis in the structure and function of animals and for preprofessional students of the health sciences.

Biology

This concentration gives the student a broad training in biology and provides a background for entry level jobs, graduate study or a single-subject teaching credential in biological sciences.

Individualized Course of Study

This program is designed to allow students who do not select either of the above concentrations to design their own career tracks with approval of their faculty advisers.

ECOLOGY AND SYSTEMATIC BIOLOGY MAJOR

The four-year program in Ecology and Systematic Biology leads to a Bachelor of Science degree. Emphasis is placed on the study of the variety of living organisms, their relationships to each other, and to their environment. The concentrations described below enable the student to tailor his or her curriculum towards specific career objectives.

CURRICULAR CONCENTRATIONS**Ecology**

This concentration stresses a broad understanding of the interactions of organisms with each other and with their environment. With this foundation, graduates may pursue careers in education, ecology, environmental impact analysis, environmental monitoring or management in either government agencies or private industries. Graduates will be academically prepared for professional certification as Associate Ecologist by the Ecological Society of America.

Marine Biology and Fisheries

This concentration prepares students for advanced training or professional employment in public or private agencies concerned with marine sciences, freshwater ecology, fisheries biology, fisheries management, or related fields. By judicial selection of electives, the student will be academically prepared to apply for professional certification as a Fisheries Biologist by the American Fisheries Society.

Systematics

This concentration stresses the identification and classification of living organisms. Graduates may pursue employment in teaching, in environmental impact analysis, or in museums, herbaria, zoos and botanical gardens, or go on to advanced education in taxonomy and systematics.

Wildlife Biology

This concentration prepares students for advanced training or professional employment in public or private agencies concerned with the biology and management of both game and nongame terrestrial wildlife species. By judicial selection of electives, the student will be academically prepared to apply for professional certification as an Associate Wildlife Biologist with the Wildlife Society.

MICROBIOLOGY MAJOR

The undergraduate program leading to the Bachelor of Science degree in Microbiology involves the study of microorganisms such as bacteria, viruses, algae, protozoa, and fungi. Special emphases are placed on their structure and function as well as their interactions with each other and with human beings.

Students are encouraged to select one of six available career tracks. Students with unique career goals are encouraged to design their own track in consultation with their adviser.

BIOTECHNOLOGY MINOR

For information regarding the Biotechnology Minor, please see College of Science and Mathematics Section.

B.S. BIOLOGICAL SCIENCES

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

** = Courses satisfy General Education and Breadth requirements*

	Units
BACT 221 General Bacteriology	4
BIO 151 Introduction to Biology (B.1.b.)*	5
BIO 152 Biology of Plants and Fungi	5
BIO 153 Biology of Animals	5
BIO 303 Genetics	3
BIO 304 Molecular Genetics (B.1.b.)*	3
BIO 414 Evolution	3
BIO 423 Cell Biology.....	4
BIO 461 Senior Project	3
Technology. Select one course from:	2
BIO 322, 324, 342, 375, 475; BOT 450	
Ecology. Select one course from:	4
BIO 325 or BOT 326	
Botany. Select one course from:	4
BOT 223, 333, 426, 437	
Zoology. Select one course from:	4
ZOO 321, 322, 323, 329, 335, 336, 341, 425	
Physiology. Select one course from:	4
BIO 431 or BOT 322	
Concentration or individualized course of study (see below)	25-34

78-87

SUPPORT COURSES

** = Courses satisfy General Education and Breadth requirements*

CHEM 127 General Chemistry (B.1.a.)*	4
CHEM 128 General Chemistry	4
CHEM 129 General Chemistry	4
MATH 120 Pre-Calculus Algebra and Trigonometry (B.2.)*	5
(MATH 118 & 119 or MATH 141 substitute)	
PHYS 121 College Physics.....	4
PHYS 122 College Physics.....	4
PHYS 123 College Physics.....	4
STAT 211 Elementary Probability and Statistics (B.2.)*	3
Computer literacy elective (F.1.)*	3
(CSC 110 or 113 recommended)	

35

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.

Additional GEB courses are listed under Major and Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B	0
<i>A minimum of 18 units is required, 18 of the units are in Major and Support</i>	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)* see Major Courses	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.)	
POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
FSN 210/PE 250/PSY 304 elective (E.2.)	
Area F:	3
<i>A total of 6 units is required, 3 of the units are in Support</i>	
Computer literacy (F.1.)* see Support Courses	
Technology elective (F.2.)	
Total	58
<i>A minimum of 79 units is required, 21 of the units are in Major and Support</i>	
ELECTIVES	9-18
	<hr/> 189

CONCENTRATION OR INDIVIDUALIZED COURSE OF STUDY (select one)**Anatomy and Physiology Concentration**

CHEM 316 Organic Chemistry	4
CHEM 317 Organic Chemistry	5
CHEM 331 Quantitative Analysis I	5
CHEM 371 Biochemical Principles.....	4
CHEM 372 Metabolism.....	3
Select three of the following courses:.....	13
ZOO 422 Functional Histology	
ZOO 432 Physiology II Comparative Systems	
ZOO 433 Physiology III: Endo. & Reproductive	
ZOO 405 Vertebrate Development	
	<hr/> 34

Biology Concentration

Select one course from each of the following areas.

A course cannot fulfill the requirements for the Major and the Concentration.

Botany	4
BOT 223, 333, 334, 426, 437	
Zoology	4
ZOO 321, 322, 323, 329, 335, 336, 341, 436	
Anatomy/Physiology	3
BACT 424	
BIO 431	
BOT 322, 335	
ZOO 237, 238 & 239, 340	
Organic Chemistry.....	4
CHEM 326 Survey of Organic Chemistry. CHEM 316 & 317 may be substituted.	
Biochemistry.....	4
CHEM 328 Survey of Biochemistry.	
CHEM 371 & 372 may be substituted.	
Adviser approved electives	6
	<hr/> 25

Individualized Course of Study

CHEM 326 Survey of Organic Chemistry	4
CHEM 316 & 317 may be substituted.	
CHEM 328 Survey of Biochemistry.....	4
CHEM 371 & 372 may be substituted.	
Adviser approved electives	17
To be selected with adviser approval from 200, 300, 400-level BACT, BIO, BOT, CONS, ZOO courses excluding BIO 205, 220, 300, 302, 306.	
	<hr/> 25

B.S. ECOLOGY AND SYSTEMATIC BIOLOGY

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements

	Units
BACT 221 General Bacteriology.....	4
BIO 151 Introduction to Biology (B.1.b.)*	5
BIO 152 Biology of Plants and Fungi.....	5
BIO 153 Biology of Animals	5
BIO 303 Genetics.....	3
BIO 325 General Ecology	4
BIO 414 Evolution	3
¹ BIO 431 Physiology I: General	4
BIO 442 Biometry.....	4
BIO 461 Senior Project.....	3
BOT 223 Introductory Plant Taxonomy	4
BOT 333 Field Botany.....	4
² ZOO 335 General Entomology	4
ZOO 437 Animal Behavior	4
Concentration courses (see below)	20-25
	<hr/> 76-81

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements.

³ CHEM 127 General Chemistry (B.1.a.)*	4
CHEM 128 General Chemistry	4
CHEM 326 Survey of Organic Chemistry (B.1.a.)* ...	4
ENGL 318 Writing for Scientific Journals.....	4
FNR 403 Environmental Impact Analysis	3
⁴ MATH 120 Pre-Calculus Algebra and Trig. (B.2.)* ...	5
PHYS 121 College Physics	4
⁵ PHYS 122 College Physics	4
SS 121 Introductory Soil Science (F.2.)*	4
STAT 211 Elem. Probability and Stat. (B.2.)*	3
STAT 212 Statistical Methods.....	3
Computer literacy elective (F.1.)*	3
(CSC 110 or CSC 113 recommended)	
	<hr/> 45

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.

Additional GEB courses are listed under Major and Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	

Area B	0
A minimum of 18 units is required; 18 of the units are in Major and Support	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)* see Major Courses	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.)	
POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.) (PSY 304 recommended)	
Area F.....	0
A minimum of 6 units is required; 6 of the units are in Support	
Computer literacy (F.1.)* see Support Courses	
Technology (F.2.)* see Support Courses	
Total.....	<hr/> 55
A minimum of 79 units is required; 24 of the units are in Major and Support	

ELECTIVES	14-9
	<hr/> 190

- ¹ Systematics Concentration (Botany emphasis) may substitute BOT 322.
- ² ZOO 336 may be substituted for ZOO 335 by students in the Marine Biology and Fisheries concentration.
- ³ CHEM 129 and 328 are recommended for students planning postgraduate training.
- ⁴ MATH 118 and 119 or 141 will substitute.
- ⁵ PHYS 123 is recommended for students planning postgraduate training.

CONCENTRATIONS (select one)**Ecology Concentration**

BIO 415 Biogeography	3
BOT 326 Plant Ecology	4
CONS 207 Resource Survey	3
ZOO 329 Vertebrate Field Zoology	4
Select two courses from the following	6
BIO 328, 334, 342;	
CONS 320, 426, 431	

 20
Marine Biology and Fisheries Concentration

BIO 328 Marine Biology or	
BIO 334 Limnology	3
BOT 437 Algology	4
CONS 320 Fishery Resource Management or	
CONS 422 Freshwater Fisheries	4
ZOO 322 Ichthyology	4
ZOO 436 Functional Invertebrate Zoology	4
Select with adviser approval from:	6
BIO 328, 334, 437;	
CONS 120, 210, 320, 422, 426, 433;	
FNR 203, 406;	
ZOO 321, 341, 421	

 25
Systematics Concentration

BIO 415 Biogeography	3
BOT 335 Plant Anatomy or	
ZOO 326 Comparative Anatomy of the Chordates	4
BOT 443 Systematic Botany	3
CONS 210 Biology and Conservation of Endangered	
Species	3
Select either Botany or Zoology emphasis with	
adviser approval:	12
Botany	
ZOO 329 Vertebrate Field Zoology (4)	
Select two from: BOT 334, 426, 437	
Zoology	
Select three from: ZOO 321, 322, 323, 336, 341	

 25
Wildlife Biology Concentration

CONS 120 Fisheries and Wildlife Management	3
CONS 427 Habitat Management	4
CONS 431 Game Management	4
ZOO 321 Mammalogy	4
ZOO 323 Ornithology	4
Select with adviser approval from:	6
BIO 334;	
CONS 207, 210, 221, 426;	
FNR 203, 302, 406;	
ZOO 341, 421	

For students seeking certification, select FNR 203, 302, 406 in lieu of free electives.

 25

B.S. MICROBIOLOGY

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements.

	Units
BACT 221 General Bacteriology.....	4
BACT 222 General Microbiology	5
BACT 402 General Virology	3
BACT 421 Food Microbiology	4
BACT 423 Medical Microbiology	5
BACT 424 Bacterial Cytology and Physiology	5
BIO 151 Introduction to Biology (B.1.b.)*	5
BIO 152 Biology of Plants and Fungi.....	5
BIO 153 Biology of Animals	5
BIO 303 Genetics	3
BIO 304 Molecular Genetics	3
BIO 375 Molecular Biology Laboratory	2
BIO 461 Senior Project.....	3
ZOO 426 Serology and Immunology	4
Restricted electives	16
To be selected in conference with adviser.	
Students are encouraged to select one of the	
following career tracks: Biotechnology, Medical	
Technology, Public Health, Applied Microbiology,	
Pre-Health Professions, and Postgraduate Studies.	
	<hr/> 72

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

CHEM 127 General Chemistry (B.1.a.)	4
CHEM 128 General Chemistry	4
CHEM 129 General Chemistry	4
¹ CHEM 326 Survey of Organic Chemistry (B.1.a.)	4
² CHEM 328 Survey of Biochemistry	4
CHEM 331 Quantitative Analysis	5
³ MATH 118 Pre-Calculus Algebra (B.2.)	4
PHYS 121 College Physics	4
PHYS 122 College Physics	4
PHYS 123 College Physics	4
⁴ STAT 211 Elementary Probability and Statistics (B.2.)	3
	<hr/> 44

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.

Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	0
A minimum of 18 units is required; 18 of the units	
are in Major and Support	
Physical science (B.1.a.)* see Support Courses	
Life science (B.1.b.)* see Major Courses	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400	
level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.)	
POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective	
(300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
FSN 210/PE 250/PSY 304 (E.2.)	
Area F:	6
Computer literacy elective (CSC 111	
recommended) (F.1.)	
Technology elective (F.2.)	
Total	<hr/> 61
A minimum of 79 units is required; 18 of the units	
are in Major and Support	
ELECTIVES	9
	<hr/> 186

¹ CHEM 316 and CHEM 317 will substitute for CHEM 326.
(Substitution strongly recommended for students in the General Microbiology Concentration.)

² CHEM 371 may be used to substitute.

³ MATH 119 or 120 will substitute.

⁴ MATH 141 will substitute.

MASTER OF SCIENCE DEGREE IN BIOLOGICAL SCIENCES

General Characteristics

This degree offers a broad background in the biological sciences. The program is designed to offer sufficient breadth and depth to strengthen the student's academic understanding and improve competence for (a) many types of biological work which require advanced training beyond the bachelor's degree, (b) employment in industry and/or civil service, (c) teaching biological sciences at the elementary, secondary and community college levels, (d) independent research in the field of specialization, or (e) continued graduate work at other institutions.

Prerequisites

Admission as a conditionally classified or classified student in this program requires a minimum grade point average of 3.0 in the last 90 quarter units attempted, satisfactory scores on the Graduate Record Examination, and letters of recommendation from persons knowing your academic potential. Advancement to candidacy requires a satisfactory background in biology, and completion of 12 units of courses specified in an informal study plan with a minimum grade point average of 3.0.

Information pertaining to specific departmental requirements for admission to graduate standing—classified or graduate standing—conditionally classified may be obtained from the Chair of the Graduate Committee (Graduate Coordinator) of the Biological Sciences Department.

Program of Study

The formal program of study for the degree must include 45 units of committee-approved graduate work, at least 30 units of which must be at the 500 level. At least 18 units of the formal program of study must be completed after the student has been advanced to candidacy. A grade point average of 3.0 or better is required in all courses taken as a graduate student. Two approaches to the M.S. degree in Biological Sciences are possible. The requirements for these two approaches are listed below.

CURRICULUM FOR M.S. BIOLOGICAL SCIENCES

	Thesis Plan	Coursework Plan
BIO 501 Cellular Biology	3	3
BIO 502 Biology of Organisms	3	3
BIO 503 Population Biology	3	3
BIO 590 Seminar in Biology	3	3
BIO 599 Thesis, including oral defense of thesis	9	—
BIO 500 Individual Study, including written report	—	4
Comprehensive Exam:		
GRE Advanced Biology	Yes	Yes
Essay	No	Yes
Electives from 500-level courses	9	14
Electives from 400- and 500-level courses	15	15
	<hr/> 45	<hr/> 45

All 45 units must be acceptable for graduate credit and in accordance with Graduate Guidelines of the Biological Sciences Department. For further information students should communicate with the head of the Biological Sciences Department or with the Chairperson of the Graduate Committee.

See COURSES OF INSTRUCTION section of this catalog for descriptions of courses in Bacteriology, Biology, Botany, Conservation, Entomology, Zoology and other subjects.

CHEMISTRY DEPARTMENT

**Faculty Offices East Bldg. (25), Room 125B
(805) 756-2693**

Faculty

Department Chair, John C. Maxwell

Linda Atwood	David L. Keeling
Christina A. Bailey	Martin A. Kellerman
Philip S. Bailey	John F. Marlier
Albert C. Censullo	Neil J. Moir
Robert S. Cichowski	William C. Rife
Lee C. Coombs	Michael G. Silvestri
Norman L. Eatough	Jan W. Simek
Leland S. Endres	Russell L. Tice
Thomas G. Frey	James D. Westover
John W. F. Goers	David G. Williamson
Ralph A. Jacobson	Max T. Wills
Dane R. Jones	

Programs

B.S. Biochemistry

B.S. Chemistry

Students may select Advanced Chemistry Electives or Concentration in:
Polymers and Coatings

The Chemistry Department has two roles in the university: to provide professional education for students who are majors in chemistry and biochemistry and who plan careers in the natural sciences and related fields, and to provide instruction in the fundamentals of chemistry to students with majors in fields related to chemistry, especially in the life sciences, agriculture, and engineering.

The Chemistry Department provides curricula leading to the Bachelor of Science in Chemistry, the Bachelor of Science in Chemistry with a concentration in Polymers and Coatings, and the Bachelor of Science in Biochemistry; the B.S. in Chemistry is certified by the American Chemical Society.

The baccalaureate curricula in biochemistry and chemistry include required courses in general chemistry, analytical chemistry, inorganic chemistry, organic chemistry, and physical chemistry. Advanced undergraduates choose electives from courses which cover a broad range of specialized topics, such as agricultural chemistry, environmental chemistry, food chemistry, geochemistry, glass chemistry, immunochemistry, industrial catalysis, nuclear chemistry, nutritional biochemistry, pharmacology, and polymer chemistry.

The Polymers and Coatings concentration includes the required courses in the chemistry curriculum and electives in the area of polymers, coatings, surface chemistry and materials engineering.

The curriculum emphasizes laboratory work, especially work with many kinds of current instrumentation, across the fields of chemistry. It also emphasizes project work: every undergraduate completes a senior project, an intensive research project designed and carried out by the student and supervised by a faculty adviser. A senior project may be pure or applied research in chemistry or biochemistry or it may be interdisciplinary work which combines chemistry with another field such as art, biology, civil or environmental engineering, psychology, or soil science. Under the department's cooperative education program, many bachelor's degree candidates work full-time in industry or government for one or two quarters, for pay and academic credit.

Career opportunities for chemists are increasing. There are openings in traditional areas such as clinical chemistry, environmental analysis, the health professions, industrial research and production, pharmacology, product quality control, and teaching at the secondary or university level; newer opportunities lie in such related areas as library science, market research, patent law, and safety engineering.

The concentration in polymers and coatings gives students the background and practical experience to move into a rewarding career in a wide range of fields including textiles, paints and varnishes, rubber, plastics, adhesives and resins.

There is a rapidly increasing number of career opportunities in the expanding fields of biotechnology and polymers and coatings. A major in biochemistry or chemistry or a minor in biotechnology prepares students for direct entry into these careers, as well as for postgraduate education in a professional specialty.

Biotechnology Minor

For information regarding the Biotechnology minor, see College of Science and Mathematics section.

CURRICULUM FOR B.S. CHEMISTRY

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

	Units		
MAJOR COURSES		GENERAL EDUCATION AND BREADTH	
* = Courses satisfy General Education and Breadth requirements		Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.	
		Additional GEB courses are listed under Major and Support Courses.	
CHEM 127 General Chemistry (B.1.a.)*	4	Area A:	14
CHEM 128 General Chemistry	4	ENGL 114 (A.1.)	
CHEM 129 General Chemistry	4	ENGL 125/PHIL 125/SPC 125 (A.2.)	
CHEM 156 General Chemistry Laboratory	1	SPC 201/SPC 202 (A.3.)	
CHEM 253 Chemical Literature	2	ENGL 215/218 (A.4.)	
CHEM 305 Physical Chemistry (B.1.a.)*	3	Area B:	0
CHEM 306 Physical Chemistry	3	A minimum of 18 units is required; 18 of the units are in Major and Support	
CHEM 307 Physical Chemistry	4	Physical science (B.1.a.)* see Major and Support Courses	
CHEM 316 Organic Chemistry	4	Life science (B.1.b)* see Support Courses	
CHEM 317 Organic Chemistry	5	Mathematics/statistics (B.2.)* see Support Courses	
CHEM 318 Organic Chemistry	5	Area C:	18
CHEM 331 Quantitative Analysis I	5	PHIL 230/PHIL 231 (C.1.)	
CHEM 332 Quantitative Analysis II	3	Critical reading electives (C.1.)	
CHEM 355 Physical Chemistry Laboratory	1	Fine and performing arts elective (C.2.)	
CHEM 356 Physical Chemistry Laboratory	1	Literature, philosophy, arts elective (300–400 level) (C.3.)	
CHEM 439 Instrumental Analysis	5	Arts and humanities elective (Area C)	
CHEM 459 Undergraduate Seminar	2	Area D:	18
CHEM 461 Senior Project	2	HIST 204 (D.1.)	
CHEM 481 Inorganic Chemistry	3	POLS 210 (D.1.)	
CHEM 483 Inorganic Synthesis	1	HIST 315 (D.2.)	
Advanced chemistry electives to complete major or concentration	18	ECON 201/ECON 211/ECON 222 (D.3.)	
	80	ANT 201/GEOG 150/SOC 105 (D.4.a.)	
		ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
		Area E:	5
		PSY 201/PSY 202 (E.1.)	
		BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
		Area F:	3
		A minimum of 6 units is required; 3 of the units are in Major and Support	
		Computer literacy (F.1.)* see Support Courses	
		Technology elective (F.2.)	
		Total	58
		A minimum of 79 units is required; 21 of the units are in Major and Support	
		ELECTIVES	9
			188
SUPPORT COURSES			
* = Courses satisfy General Education and Breadth requirements			
BIO 101/BOT 121/ZOO 131 (B.1.b.)*	3		
CSC 110 Computers and Computer Applications or			
CSC 111 Introduction to Computer Applications			
for the Sciences (F.1.)*	3		
MATH 131, 132, 133 Technical Calculus or			
MATH 141, 142, 143 Calculus I, II, III (B.2.)*	4,4,4		
MATH 241, MATH 242 or STAT or CSC courses	4,4		
PHYS 131 General Physics (B.1.a.)*	4		
PHYS 132 General Physics	4		
PHYS 133 General Physics	4		
Physics elective (200-level and above except			
PHYS 215)	3		
	41		

ADVANCED CHEMISTRY ELECTIVES OR CONCENTRATION

Select either the advanced chemistry electives or the concentration.

Advanced Chemistry Electives 18

Select 18 units of approved chemistry electives. At least three courses must be chosen from List B.

List A

- CHEM 252 Laboratory Glassblowing (1)
- CHEM 335 Clinical Chemistry (3)
- CHEM 336 Clinical Chemistry (4)
- CHEM 341 Environmental Chemistry: Water Pollution (3)
- CHEM 342 Environmental Chemistry: Air Pollution (3)
- CHEM 344 Chemical Process Principles (3)
- CHEM 350 Chemical Safety (1)
- CHEM 371 Biochemical Principles (4)
- CHEM 372 Metabolism (3)
- CHEM 373 Molecular Biology (3)
- CHEM 374 Biochemistry Laboratory (2)
- CHEM 377 Chemistry of Drugs and Poisons (3)
- CHEM 385 Geochemistry (3)
- CHEM 400 Special Problems (1–3)
- CHEM 446 Surface Chemistry of Materials (3)
- CHEM 447 Polymers and Coatings Laboratory I (2)
- CHEM 448 Polymers and Coatings Laboratory II (2)
- CHEM 449 Internship in Polymers and Coatings (2)
- CHEM 450 Chemical Warfare (2)
- CHEM 455 FT-NMR Laboratory (1)
- CHEM 470 Selected Advanced Topics (1–3)
- CHEM 471 Selected Advanced Laboratory (1–3)
- CHEM 473 Immunochemistry (3)
- CHEM 474 Protein Techniques Laboratory (2)
- CHEM 477 Biochemical Pharmacology (3)
- CHEM 485, 495 Cooperative Ed. Experience (6, 12)

List B (Select at least 3 courses)

- CHEM 419 Bioorganic Chemistry (3)
- CHEM 420 Advanced Organic Chemistry - Synthesis (3)
- CHEM 444 Polymers and Coatings I (3)
- CHEM 445 Polymers and Coatings II (3)
- CHEM 446 Surface Chemistry of Materials (3)
- CHEM 457 Qualitative Organic Analysis (3)
- CHEM 458 Instrumental Org. Qualitative Analysis (3)
- CHEM 462 Senior Project (2)

Polymers and Coatings Concentration

- CHEM 444 Polymers and Coatings I 3
- CHEM 445 Polymers and Coatings II 3
- CHEM 446 Surface Chemistry of Materials 3
- CHEM 447 Polymers and Coatings Lab I 2
- CHEM 448 Polymers and Coatings Lab II 2
- CHEM 449 Internship in Polymers and Coatings 2
- MATE 206 Materials Engineering 3

18

B.S. BIOCHEMISTRY

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements

	Units
CHEM 127 General Chemistry (B.1.a.)*	4
CHEM 128 General Chemistry	4
CHEM 129 General Chemistry	4
CHEM 253 Chemical Literature	2
CHEM 301, 302 Biophysical Chemistry	3,4
(CHEM 305, 306, 355 will substitute)	
CHEM 316 Organic Chemistry	4
CHEM 317 Organic Chemistry	5
CHEM 318 Organic Chemistry	5
CHEM 331 Quantitative Analysis I	5
CHEM 371 Biochemical Principles	4
CHEM 372 Metabolism	3
CHEM 373 Molecular Biology	3
CHEM 374 Biochemistry Laboratory	2
CHEM 459 Undergraduate Seminar	2
CHEM 461 Senior Project	2
Approved Chemistry electives	9
CHEM 156, 252, 300-400-level courses (except 326 and 328).	

65

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

BOT 121/ZOO 131/BACT 221 (B.1.b.)*	4
CSC 110 Computers and Computer Applications or CSC 111 Introduction to Computer Applications for the Sciences (F.1.)*	3
MATH 131, 132 Technical Calculus or MATH 141, 142 Calculus I, II (B.2.)*	4,4
PHYS 121, 122 College Physics or PHYS 131, 132 General Physics (B.1.a.)*	4,4
PHYS 123 College Physics or PHYS 133 General Physics	4
Life science elective	3

30

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300-400 level.

Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/218 (A.4.)	

Area B:	2
A minimum of 18 units is required; 16 of the units are in Major and Support	

Physical science (B.1.a.)* see Major and Support Courses

Life sciences elective (300 level recommended) (B.1.b.)* also see Support Courses

Mathematics/statistics (B.2.)* see Support Courses

Area C:	18
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PHIL 230/PHIL 231 (C.1.)

Critical reading electives (C.1.)

Fine and performing arts elective (C.2.)

Literature, philosophy, arts elective (300-400 level) (C.3.)

Arts and humanities elective (Area C)

Area D:	18
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HIST 204 (D.1.)

POLS 210 (D.1.)

HIST 315 (D.2.)

ECON 201/ECON 211/ECON 222 (D.3.)

ANT 201/GEOG 150/SOC 105 (D.4.a.)

ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300-400 level) (D.4.b.)

Area E:	5
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PSY 201/PSY 202 (E.1.)

BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)

Area F:	3
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A minimum of 6 units is required; 3 of the units are in Major and Support

Computer literacy (F.1.)* see Support Courses

Technology elective (F.2.)

Total	60
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A minimum of 79 units is required; 19 of the units are in Major and Support

ELECTIVES	31
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186

¹ CHEM 305, 306, 355 will substitute for CHEM 301, 302.

MATHEMATICS DEPARTMENT

**Faculty Offices East Bldg. (25), Room 208
(805) 756-2206**

Faculty

Department Chair, Stephen T. Weinstein

Steven J. Agronsky	Kempton L. Huehn
Sabah Al-hadad	Rex L. Hutton
Alfred M. Bachman	Goro C. Kato
Estelle L. Basor	Euel W. Kennedy
Michael R. Colvin	Martin T. Lang
H. Arthur DeKleine	George M. Lewis
James E. Delany	George W. Luna
Gary M. Epstein	Jean M. McDill
Gerald P. Farrell	Kent E. Morrison
Jack E. Girolo	James R. Mueller
D. Edward Glassco	Paul F. Murphy
Stuart Goldenberg	Thomas D. O'Neil
Harvey C. Greenwald	Linda J. Patton
Thomas E. Hale	Don P. Rawlings
Adelaide T. Harmon-Elliott	H. Bernard Strickmeier
Donald G. Hartig	Raymond D. Terry
Alan W. Holz	John Van Eps
J. Myron Hood	Robert S. Wolf

physical sciences and engineering, but also to obtain experience with the mathematics that is used in business, management sciences, and operations research.

Students wishing to prepare for a teaching career in junior or senior high school may make a selection of courses especially designed to satisfy California single subject credential requirements.

All of these programs provide a strong mathematical foundation for the student contemplating the pursuit of an advanced degree in mathematics.

Programs

B.S. Mathematics

M.S. Mathematics

Mathematics Minor

The Mathematics Department offers a complete undergraduate program of courses leading to a Bachelor of Science degree in mathematics. It also offers a program of courses for students who wish to minor in mathematics, as well as graduate courses for programs of study leading to a Master of Science degree. The applied flavor of these courses increases both the usefulness of and the demand for the graduates with a degree in mathematics. In addition, the Mathematics Department offers courses that serve all departments in the university.

The undergraduate program for math majors contains a central core of courses. These courses give a solid basis for advanced work that is tailored to fit the needs and objectives of each individual student. The choice of advanced coursework is chosen in close consultation with faculty advisers.

The rich variety of courses available in the department permits the student not only to obtain a broad exposure to those fields of mathematics which are most useful in the

B.S. MATHEMATICS

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

	<i>Units</i>		
MAJOR COURSES		Area B:	3
* = Courses satisfy General Education and Breadth requirements		<i>A minimum of 18 units is required; 15 of the units are in Major and Support</i>	
MATH 141 Calculus I (B.2.)*	4	Physical science (B.1.a.)* see Support Courses	
MATH 142 Calculus II	4	Life sciences elective (B.1.b.)	
MATH 143 Calculus III	4	Mathematics/statistics (B.2.)* see Major and Support Courses	
MATH 202 Orientation to the Mathematics Major	1	Area C:	18
¹ MATH 206 Linear Algebra I.....	4	PHIL 230/PHIL 231 (C.1.)	
MATH 241 Calculus IV.....	4	Critical reading electives (C.1.)	
MATH 242 Differential Equations	4	Fine and performing arts elective (C.2.)	
MATH 248 Methods of Proof in Mathematics	4	Literature, philosophy, arts elective (300–400 level) (C.3.)	
MATH 336 Combinatorial Mathematics	3	Arts and humanities elective (Area C)	
MATH 412 Advanced Calculus I	4	Area D:	18
MATH 459 Undergraduate Seminar	2	HIST 204 (D.1.)	
² MATH 461 Senior Project	3	POLS 210 (D.1.)	
MATH 462 Senior Project	2	HIST 315 (D.2.)	
MATH 481 Modern Algebra I.....	4	ECON 201/ECON 211/ECON 222 (D.3.)	
³ Advanced Work in Major.....	20-28	ANT 201/GEOG 150/SOC 105 (D.4.a.)	
	67-75	ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
SUPPORT COURSES		Area E:	5
* = Courses satisfy General Education and Breadth requirements		PSY 201/PSY 202 (E.1.)	
CSC 118 Fundamentals of Computer Science I (F.1.)*	4	BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
⁴ CSC 201/CSC 207/CSC 240.....	3	Area F:	2
CSC 218 Fundamentals of Computer Science II	3	<i>A minimum of 6 units is required; 4 of the units are in Support</i>	
PHYS 131 General Physics (B.1.a.)*.....	4	Computer literacy (F.1.)* see Support Courses	
PHYS 132 General Physics (B.1.a.)*.....	4	Technology elective (F.2.)	
PHYS 133 General Physics	4	Total.....	60
STAT 321 Statistical Analysis I (B.2.)*	3	<i>A minimum of 79 units is required; 19 of the units are in Major and Support</i>	
STAT 322 Statistical Analysis II.....	4	ELECTIVES	22
³ Advanced Work in Support	8-0		186
	37-29		
GENERAL EDUCATION AND BREADTH			
<i>Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.</i>			
Area A:	14		
ENGL 114 (A.1.)			
ENGL 125/PHIL 125/SPC 125 (A.2.)			
SPC 201/SPC 202 (A.3.)			
ENGL 215/ENGL 218 (A.4.)			

¹ Recommended to be taken concurrently with MATH 241.

² Candidates for a teaching credential in mathematics may take EDUC 410 and EDUC 420 in place of MATH 461.

³ Advanced Work in Major and Support are to total 28 units.

⁴ CSC 207 to be taken by Math majors in the teaching credential program.

ADVANCED WORK IN THE B.S. MATHEMATICS CURRICULUM

Select 28 units from the advanced study tracks or from the list of additional electives below. Three advanced study tracks must be completed, at least two of which are to be chosen from the first four tracks listed.

Advanced Study Tracks

Select a minimum of two tracks from the following:

- MATH 306, 406 Linear Algebra II, III (4) (4)
- MATH 341 Theory of Numbers (4), MATH 482 Modern Algebra II (4)
- MATH 413, 414 Advanced Calculus II, III (4) (4)
- MATH 431, 432 Mathematical Optimization I, II (3) (3)

Additional study tracks:

- MATH 304 Vector Analysis (4), MATH 404 Introduction to Differential Geometry and Topology (4)
- MATH 304 Vector Analysis (4), MATH 418 Partial Differential Equations (4)
- MATH 335 Graph Theory (3), MATH 437 Game Theory (3)
- MATH 408 Functions of a Complex Variable (4), MATH 409 Complex Analysis (4)
- MATH 442 Euclidean Geometry (4), MATH 443 Modern Geometries (4)

Additional electives in Major. Select from:

MATH 300, 350, 417, 419, 470

Additional electives in Support. Select from:

CSC 219, 221, 332, 333, 345, 346, 350, 360, 433
 IME 301, 305
 STAT 425, 426, 427

MATHEMATICS MINOR

Students may earn a minor in mathematics by completing a coordinated course of study consisting of 30 units. The program consists of a core of required courses, followed by two tracks of advanced work, to be chosen in concert with a student's career objectives. Interested students should contact the Mathematics Department for individual advisement.

I. Required courses	<i>Units</i> 8
MATH 206 Linear Algebra I (4)	
MATH 248 Methods of Proof in Mathematics (4)	

II. Complete at least two of the following tracks.... 12–16
 A track consists of at least two courses from the following groups of courses.
 Completion of all four courses in the last group is considered two tracks.
 Some tracks have additional mathematics prerequisites such as MATH 242.

MATH 304 Vector Analysis (4)
 MATH 317/318 Engineering Math (4)
 MATH 418 Partial Differential Equations (4)

MATH 306 Linear Algebra II (4)
 MATH 406 Linear Algebra III (4)

MATH 335 Graph Theory (3)
 MATH 336 Combinatorial Mathematics (3)
 MATH 437 Game Theory (3)

MATH 408 Functions of a Complex Variable (4)
 MATH 409 Complex Analysis (4)

MATH 412 Advanced Calculus I (4)
 MATH 413 Advanced Calculus II (4)

MATH 431 Mathematical Optimization I (3)
 MATH 432 Mathematical Optimization II (3)

MATH 442 Euclidean Geometry (4)
 MATH 443 Modern Geometries (4)

MATH 341 Theory of Numbers (4)
 MATH 419 Intro. to History of Mathematics (4)
 MATH 481 Modern Algebra I (4)
 MATH 482 Modern Algebra II (4)

III. Completion of 30 units of Mathematics courses with at least 15 units in 300 or 400 level courses. ... 10-6

MASTER OF SCIENCE DEGREE IN MATHEMATICS

General Characteristics

The master of science program in mathematics prepares students to enter careers in government, industry or teaching. A student who completes the degree will be qualified and eligible to teach at the community college level. Many of the graduates of the program also pursue further graduate study at Ph.D. granting institutions.

Prerequisites

Prerequisite to entering the program with a classified or conditionally classified status, the student must have a bachelor's degree from an accredited institution with a minimum grade point average of 2.5 in the last 90 quarter units attempted. Applicants with majors in other areas or applicants with deficiencies in their undergraduate background may be admitted conditionally. For information concerning additional departmental requirements, the student should contact the Graduate Coordinator in the Mathematics Department.

Advancement to candidacy requires completion of 12 units of an approved study plan with a minimum grade point average of 3.0 and satisfactory completion of the preliminary examinations in analysis and algebra.

CURRICULUM FOR M.S. MATHEMATICS

	<i>Units</i>
Required courses	24
MATH 540 Introduction to Topology (4)	
MATH 550 Real Analysis (4)	
MATH 560 Field Theory (4)	
Complete one of the following two tracks:	
MATH 520, 521, 522 Applied	
Analysis I, II, III (12)	
MATH 530, 531, 532 Graduate Discrete	
Mathematics with Applications I, II, III (12)	
MATH, CSC, STAT electives	12
Select 400–500 level MATH, CSC, or STAT courses	
as approved by the advising committee.	
Electives	9
Select additional units at the 400 or 500 level as	
approved by the advising committee.	
Satisfactorily complete the comprehensive	
examinations.	
	45

PHYSICAL EDUCATION AND KINESIOLOGY DEPARTMENT

Physical Education Bldg. (43), Room 453
(805) 756-2545

Faculty

Department Head, Dwayne G. Head

Doris Acord	Kellie G. Hall
Katharine Barthels	Vaughan D. Hitchcock
C. Andrea Brown	Raymond Nakamura
Victor A. Buccola	Andrew J. Proctor
Steven C. Davis	Mary L. Stallard
Gerald DeMers	James L. Webb
Sonja M. Glassmeyer	

Programs

B.S. Physical Education

Students may select Individualized Course of Study or a Concentration in:
Commercial and Corporate Fitness
Health Education
Pre-Physical Therapy
Teaching

M.S. Physical Education

The Physical Education and Kinesiology Department offers undergraduate and graduate degree programs in physical education. The department also contributes to the general education and elective needs of all students by providing health education, physical education and first aid/CPR courses. Because of an ideal geographical location, the university has become a center for workshops held by some of the state's health and physical education organizations.

The new Recreation Center, which opened in 1993, provides state-of-the-art laboratory, activity and office space for the department. Campus facilities accommodate an extensive physical education instructional program as well as full-scale athletic, intramural, and recreational sports programs.

The B.S. in Physical Education is a broad based program offering students curricular choices for a wide range of career opportunities. Concentrations include teaching, health education, commercial and corporate fitness, and pre-physical therapy. Students also have the option of choosing an individualized course of study.

CURRICULAR CONCENTRATIONS

Commercial and Corporate Fitness

Incorporates basic knowledge of business and managerial skills with the scientific and clinical knowledge of exercise physiology, human chemistry, psychology and nutrition.

Graduates work in a wide range of enterprises which include: fitness programs, YMCA/YWCA, private health clubs and various wellness evaluation and rehabilitation programs.

Health Education

Prepares students for careers in education, public and private health-related agencies and for graduate school in the health sciences. Coursework focuses on working with others to enhance the quality of life through physical and mental health.

Pre-Physical Therapy

Prepares students seeking a career in physical therapy and for admission to a graduate program in physical therapy. The course of study focuses on the biological and physical concepts underlying the practice of physical therapy. Physical therapy professionals work with persons of all ages with movement dysfunctions in public and private therapy settings, in hospitals and homes, and as consultants to businesses and health promotion programs.

Teaching

Prepares students to meet subject matter competency required for application to the Single Subject Credential program in Physical Education. Also see Teaching Credential Programs.

Individualized Course of Study

Students may choose one of the above mentioned concentrations or pursue an individualized course of study. Courses are selected with adviser approval.

Certificates

Aquatic Certificate

Provides students from all disciplines an opportunity to develop knowledge and skills necessary for employment as aquatic facility managers or directors. National certifications are available as water safety instructor, lifeguard instructor, and certified pool operator.

Coaching Certificate

Provides teaching credential students, who are in a discipline other than physical education, an opportunity to develop knowledge and skills necessary for effective coaching. The program benefits those students who wish to coach individual or team sports at the high school or junior high level or who wish to coach non-school related sports.

B.S. PHYSICAL EDUCATION

For course prerequisites, please refer to the "Course Descriptions" section of this catalog. In scheduling your courses each quarter, consult with your academic adviser.

	Units
MAJOR COURSES	
PE 206–PE 229 Professional Activity/DANC 211 Dance Fundamentals	8
PE 218 Aquatics	2
PE 250 Health Education	2
PE 252 Introduction to Athletic Training	2
PE 280 First Aid and CPR	3
PE 302 Mechanical Kinesiology	4
PE 303 Physiology of Exercise	4
PE 307 Adaptive Physical Education	4
PE 318 Measurement and Evaluation in Physical Education I	3
PE 319 Measurement and Evaluation in Physical Education II	4
PE 401 Administration of Physical Education and Health/Fitness Programs	3
PE 402 Motor Learning and Control	4
PE 404 Motor Development	3
PE 411 The Human Element in Sport	3
PE 461 Senior Project	2
PE 462 Senior Project	1
PE 474 History and Philosophy of Physical Education	3
Concentration courses (see below)	37-39
	<hr/> 92-94

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

CHEM 121 General Chemistry or CHEM 127 General Chemistry (B.1.a.)*	4
ENGL 302/ENGL 310/ENGL 318 (Students in Teaching Concentration must take ENGL 302)	4
FSN 210 Nutrition (E.2.)*	3
MATH 118 or MATH 116 and MATH 117 (B.2.)*	3
PSY 201/PSY 202 General Psychology (E.1.)*	3
STAT 217 Statistical Methods (B.2.)*	4
ZOO 131 General Zoology (B.1.b.)*	4
ZOO 237 Human Anatomy	3
ZOO 238, ZOO 239 Human Physiology (B.1.b.)* ...	3,3
ZOO 340 Human Muscle Anatomy	2

36
GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.

Additional GEB courses are listed under Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	
Area B:	0
A minimum of 18 units is required; 18 of the units are in Major and Support	
Physical science (B.1.a.)* see Support Courses	
Life sciences (B.1.b.)* see Support Courses	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.)	
POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/ECON 211/ECON 222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	0
A minimum of 5 units is required; 5 of the units are in Support	
Psychology (E.1.)* see Support Courses	
(E.2.)* see Support Courses	
Area F:	6
Computer literacy elective (F.1.)	
Technology elective (F.2.)	
Total	<hr/> 56
A minimum of 79 units is required; 23 of the units are in Major and Support	

ELECTIVES..... 11-9

CONCENTRATIONS (select one)**Commercial and Corporate Fitness Concentration**

PE 408 Exercise and Health Promotion for Senior Adults	3
PE 434 Design and Implementation of Health and Fitness Programs	3
PE 439 Commercial/Corporate Fitness Internship or PE 485/PE 495 Cooperative Education Experience	3
PE 445 Electrocardiography	3
PE 450 Lifestyle Management	3
PE 451 Nutrition for Fitness and Sport	3
PE 452 Testing and Exercise Prescription for Fitness Specialists	3
CHEM 326 Survey of Organic Chemistry	4
CHEM 328 Survey of Biochemistry	4
MGT 118 Intro. to Human Relations in Business	3
MGT 201 Principles of Management	3
SPC 301 Business and Professional Communication	4
	<hr/>
	39

Health Education Concentration

PE 305 Drug Education	2
PE 354 School Health Programs	2
PE 405 Administration of Health Education	2
PE 408 Exercise & Health Promotion Senior Adults ...	3
PE 450 Lifestyle Management	3
PE 451 Nutrition for Fitness and Sport	3
ANT 401 Culture and Health	3
BACT 221 General Bacteriology	4
BIO 253 Orientation to the Health Professions	1
BIO 300 Biology of Cancer	2
BIO 302 Human Genetics	3
FSN 310 Maternal and Child Nutrition	3
HD 308 Adulthood or	
PSY 459 Lifespan Theories	3
PSY 205 Human Sexuality	3
	<hr/>
	37

Teaching Concentration

PE 209 Creative and Non-Traditional Games	1
PE 215 Field Sports	2
PE 275 Sports Officiating	2
PE 276 Athletic Coaching Theory	3
PE 296 Planning Techniques in Physical Education ...	3
PE 354 School Health Programs	2
PE 356 Teaching Gymnastics	2
PE 384 Water Safety Instructor	3
PE 419 Curriculum and Program Content in Elementary Physical Education	3
PE 421 Strategies for Teaching Physical Education ...	3
PE 422 Teaching Elementary Physical Education	2
PE 423 Teaching Secondary Physical Education	3
PE 424 Organization and Implementation of K-12 Physical Education Programs	3
DANC 381 Methods of Teaching Dance	4
REC 260 Intramural and Recreational Sports	3
	<hr/>
	39

Pre-Physical Therapy Concentration

PHYS 121 College Physics	4
PHYS 122 College Physics	4
PHYS 123 College Physics	4
BIO 153 Biology of Animals	5
CHEM 128 General Chemistry	4
CHEM 129 General Chemistry	4
Select from the following with adviser's approval	12
PE 400, 408, 432, 434, 437, 445	
BACT 221	
CHEM 326	
PSY 317, 405	
	<hr/>
	37

MASTER OF SCIENCE DEGREE IN PHYSICAL EDUCATION

General Characteristics

The degree program is designed to offer advanced study in physical education which will qualify men and women to enter the field at occupational levels requiring a master's degree. The program offers the increased depth and quality needed for teaching physical education at the secondary and community college levels, and positions in corporate, private, and governmental agencies as well as those in clinical preventative and/or rehabilitative health settings.

Areas of Emphasis

Students may select one of the following areas of emphasis which is most compatible with career and personal objectives.

Exercise Science and Health Promotion

Exercise Science and Health Promotion is an extension of the Commercial/Corporate Fitness Concentration under the B.S. degree program in Physical Education. This emphasis prepares students to work in the health promotion field in diversified settings, including corporate, club, private, and governmental. It also qualifies graduates to pursue clinically oriented positions in preventative and rehabilitative health programs as well as providing students with an excellent background for advanced study.

Human Movement and Sport

This emphasis is offered for students who wish advanced preparation for elementary, secondary, or college positions in physical education and coaching. It is oriented toward a practical application and offers an opportunity for the in-depth study needed for (a) teaching physical education at all levels; (b) coaching at the secondary and post-secondary levels, as well as with private and municipal agencies; and (c) continued graduate work at other institutions.

Prerequisites

Conditionally Classified Standing

Applicants to the M.S. degree program in Physical Education should have an undergraduate degree in Physical Education or equivalent academic preparation. Those applicants with undergraduate deficiencies must remove these deficiencies through coursework or examination before Advancement to Candidacy.

Information pertaining to specific requirements for admission may be obtained from the Graduate Coordinator of the Physical Education Program.

Classified Standing

For admission to classified standing, an applicant must have an undergraduate major in physical education or equivalent academic preparation as determined by the departmental coordinator of graduate studies and a minimum grade point average of 2.75 in the last 90 units of undergraduate work. Students below a 2.75 GPA may appeal to the Graduate Coordinator to be "conditionally" accepted. This latter procedure will involve a review process and a specified contract to be successfully completed before admission to classified standing.

Advancement to Candidacy

For Advancement to Candidacy, a student shall have:

- A. Successfully completed all "conditionally classified requirements;
- B. Successfully completed the Graduation Writing Requirement;
- C. Maintained a minimum 3.0 GPA for all course work completed; and
- D. Filed a Formal Study Plan.

At least 18 units must be completed after advancement to candidacy.

Requirements for the Degree

The formal program of study must include 45 units of approved graduate work; at least 33 of these units must be completed at the 500 level in Physical Education.

All candidates must meet the current Graduation Writing Requirement.

Each candidate must successfully complete a comprehensive examination before the degree is granted. This examination may take one of two forms: (1) those students presenting a thesis or project must successfully defend the thesis or project in an oral examination, or (2) those students not presenting a thesis or project must pass an oral examination dealing with general current knowledge of the profession and coursework taken toward the degree requirements. *If the degree is not completed within 4 years, the graduate faculty will require that a thesis candidate also be tested on coursework.*

Up to 12 units may be taken in 400-level courses with adviser approval, provided these courses were not required as part of the undergraduate degree program. Graduate students taking 400-level courses will be required to complete assignments beyond those normally required of undergraduate students and will be graded against more rigorous standards than those applied to undergraduate students in the same course. A maximum of 12 adviser approved units may be taken outside of the Physical Education and Kinesiology Department.

CURRICULUM FOR M.S. PHYSICAL EDUCATION

Required courses	<i>Units</i> 19
PE 515 Behavior and Communication in a Health and Physical Education Setting (3)	
PE 517 Research Methods in Physical Education (3)	
PE 519 Evaluation of Current Studies (3)	
PE 522 Biomechanics (3)	
PE 525 Human Performance and Learning (3)	
PE 530 Advanced Physiology of Exercise (4)	
Area of Emphasis	12/16
<i>Exercise and Health Promotion Emphasis (16)</i>	
PE 503 Seminar in Adult Wellness (3)	
PE 504 Cardiopulmonary Physiology, Pathology and Exercise (3)	
PE 514 Health Education Planning (3)	
PE 516 Management of Health Promotion in the Workplace (3)	
PE 536 Advanced Electrocardiography (4)	
<i>Human Movement and Sport Emphasis (12)</i>	
PE 502 Current Trends and Issues in Physical Education (3)	
PE 511 Administration of Physical Education and Athletics (3)	
PE 526 Sport in American Society (3)	
PE 539 Observation, Development and Analysis of Teaching (3)	
Electives to be selected with adviser's approval...	14/10
	<hr/> 45

For more detailed information or advisement, students should communicate with the Coordinator of Graduate Studies for Physical Education.

PHYSICS DEPARTMENT

Science Bldg. (52), Room D-37
(805) 756-2448

Faculty

Chair, Robert H. Dickerson

Lawrence H. Balthaser	John Mottmann
Joseph C. Boone	Kenneth S. Ozawa
Ronald F. Brown	Ralph A. Peters
Anthony J. Buffa	John E. Poling
Arthur S. Cary	David M. Roach
David H. Chipping	Richard A. Saenz
Gayle Cook	Thomas G. Schumann
Neil L. Fleishon	Keith S. Stowe
Theodore C. Foster	Nilgun Sungar
Richard B. Frankel	Willem L. van Wyngaarden
David W. Hafemeister	Leonard W. Wall
Kenneth A. Hoffman	Walter D. Wilson
James S. Kalathil	Ronald E. Zammit
Randall D. Knight	

Programs

B.S. Physical Science

B.S. Physics

Students may select Advanced Physics Electives or a Concentration in:
Electronics
Electro-optics

The Physics Department offers curricula in physics and in physical sciences leading to the Bachelor of Science degree. It also serves all colleges of the university by offering courses which provide the scientific foundations for work taken by students in their major fields. The department contributes to the general education of all students by increasing their understanding of the process of scientific discovery, of the nature of the physical universe, and of the potential impact of science on society.

B.S. PHYSICS

The department's goal in educating physics majors is to train them for positions as physicists in industry or government laboratories, to prepare them for further training as physics teachers, or to give them a strong foundation in science that will enable them to enter other related professions. The program also provides students with excellent preparation for graduate school. Physicists are engaged in many fields, including electronics and computers, lasers, aerospace, energy production and utilization, the development of new materials, and state-of-the-art research on topics ranging from quarks to astrophysics.

To prepare physics majors effectively for employment, the department provides a comprehensive laboratory program. Facilities include specialized laboratories in electrical measurements, optics, solid state physics, nuclear physics, and atomic physics. Student activities include a chapter of the national Society of Physics Students and a chapter of the national physics honor society, Sigma Pi Sigma.

Students have the choice of selecting one of the specialized concentrations or following the general physics curriculum, which offers a variety of elective coursework. Students who are planning to pursue graduate studies in physics are advised to follow the general curriculum. The electronics concentration is designed for students wishing to acquire a working knowledge of electronics for use in experimental physics. The electro-optics concentration provides a background in optical devices and techniques used in this rapidly expanding field.

High school students planning to major in physics should include in their high school program as much as possible of the following: eight semesters of college preparatory mathematics, two of physics and two of chemistry.

B.S. PHYSICAL SCIENCE

The B.S. in Physical Science is designed primarily to prepare students who intend to be secondary school teachers of one or more of the physical sciences. It may also serve students who plan to enter another field in which a physical science background would be useful. Students intending to do graduate study in either chemistry or physics should elect a chemistry or physics major. Students planning to qualify for a teaching credential in physical science should plan their electives to include the education courses indicated. The Physical Science degree program is administered jointly by the Chemistry and Physics Departments.

B.S. PHYSICS

Courses are displayed by Major, Support, Concentration, General Education and Breadth, and Electives.

	Units		
MAJOR COURSES		GENERAL EDUCATION AND BREADTH	
* = Courses satisfy General Education and Breadth requirements		Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level. Additional GEB courses are listed under Support Courses.	
PHYS 131 General Physics.....	4	Area A:	14
PHYS 132 General Physics.....	4	ENGL 114 (A.1.)	
PHYS 133 General Physics.....	4	ENGL 125/PHIL 125/SPC 125 (A.2.)	
PHYS 206 Instrumentation in Experimental Physics...	3	SPC 201/SPC 202 (A.3.)	
PHYS 211 Modern Physics I.....	4	ENGL 215/ENGL 218 (A.4.)	
PHYS 212 Modern Physics II.....	3	Area B:	3
PHYS 243 Introductory Modern Physics Laboratory ..	1	A minimum of 18 units is required; 16 of the units are in Major and Support	
PHYS 256 Electrical Measurements Laboratory	1	Physical science (B.1.a.)* see Support Courses	
PHYS 301 Thermal Physics I.....	3	Life sciences elective (B.1.b.)	
PHYS 302 Analytical Mechanics I	3	Mathematics/statistics (B.2.)* see Major and Support Courses	
PHYS 303 Analytical Mechanics II	3	Area C:	18
PHYS 323 Optics	4	PHIL 230/PHIL 231 (C.1.)	
PHYS 341 Quantum Physics Laboratory I	1	Critical reading electives (C.1.)	
PHYS 342 Quantum Physics Laboratory II	2	Fine and performing arts elective (C.2.)	
PHYS 363 Undergraduate Seminar	2	Literature, philosophy, arts elective (300–400 level) (C.3.)	
PHYS 405 Quantum Mechanics I	3	Arts and humanities elective (Area C)	
PHYS 408 Electromagnetic Fields and Waves I	4	Area D:	18
PHYS 409 Electromagnetic Fields and Waves II	3	HIST 204 (D.1.)	
PHYS 461 Senior Project.....	2	POLS 210 (D.1.)	
PHYS 462 Senior Project.....	2	HIST 315 (D.2.)	
MATH 242 Differential Equations	4	ECON 201/211/222 (D.3.)	
MATH 304 Vector Analysis (B.2.) *	4	ANT 201/GEOG 150/SOC 105 (D.4.a.)	
MATH 318 Advanced Engineering Mathematics	4	ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
MATH 418 Partial Differential Equations.....	4	Area E:	5
Advanced Physics electives or Concentration courses (see below)	21	PSY 201/PSY 202 (E.1.)	
	93	BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
		Area F:	3
SUPPORT COURSES		A minimum of 6 units is required; 3 of the units are in Support	
* = Courses satisfy General Education and Breadth requirements		Computer literacy (F.1.)* see Support Courses	
CHEM 127 General Chemistry (B.1.a.) *	4	Technology elective (F.2.)	
CHEM 128 General Chemistry (B.1.a.) *	4	Total	60
CHEM 129 General Chemistry	4	A minimum of 79 units is required; 18 of the units are in Support	
CSC 118/204 (F.1.) * (CSC 118 recommended).....	3		
MATH 141 Calculus I (B.2.) *	4	ELECTIVES	9
MATH 142 Calculus II.....	4		
MATH 143 Calculus III.....	4		
MATH 241 Calculus IV	4		
	31		194

ADVANCED PHYSICS ELECTIVES OR CONCENTRATION

Select *either* the advanced physics electives *or* one of the concentrations.

Advanced Physics Electives

- Select one of the following: PHYS 403, 406, or 412 3
- Select 18 units of approved physics electives (listed below)..... 18
- For students anticipating an industrial career PHYS 357, 412, 413, 423, and 452 are suggested electives.
- For students anticipating graduate work in physics PHYS 202, 401, 406, 424, and MATH 408 are suggested electives. In addition, PHYS 357 is suggested for students who anticipate becoming experimental physicists.
- PHYS 202 Physics and the Computer (3)
- PHYS 317 Special Theory of Relativity (3)
- PHYS 357 Advanced Instrumentation in Experimental Physics (3)
- PHYS 401 Thermal Physics II (3)
- PHYS 403 Nuclear and Particle Physics (3)
- PHYS 406 Quantum Mechanics II (3)
- PHYS 410 Physics of the Solid Earth (3)
- PHYS 412 Solid State Physics (3)
- PHYS 413 Advanced Topics in Solid State Physics (3)
- PHYS 416 Theoretical Acoustics (3)
- PHYS 423 Advanced Optics (4)
- PHYS 424 Theoretical Physics (3)
- PHYS 452 Solid State Physics Laboratory (1)
- PHYS 470 Selected Advanced Topics (1-3)
- PHYS 471 Selected Advanced Laboratory (1-3)
- MATH 408 Functions of a Complex Variable (4)

 21
Electronics Concentration

Students will not be allowed to enroll in EE 301 until they have a) completed PHYS 357 and MATH 318, and b) received the approval of advisers in both Physics and Electrical Engineering. Students will then be allowed to enroll in EE courses with physics courses substituting for EE prerequisites.

- PHYS 357 Advanced Instrumentation in Experimental Physics 3
- EE 301 Linear Systems Analysis 3
- EE 302 Linear Control Systems 3
- EE 307 Digital Integrated Electronics..... 3
- EE 341 Linear Analysis Laboratory 1
- EE 342 Control Systems Laboratory 1
- EE 347 Digital Integrated Electronics Laboratory 1
- EE electives to be selected from the following list:..... 6
- EE 308, 309, 313, 328, 348, 349, 353

 21
Electro-optics Concentration

Students will not be allowed to enroll in EE 301 until they have a) completed PHYS 357 and MATH 318, and b) received approval of advisers in both Physics and Electrical Engineering. Students will then be allowed to enroll in EE courses with physics courses substituting for EE prerequisites.

- PHYS 357 Advanced Instrumentation in Experimental Physics 3
- PHYS 423 Advanced Optics 4
- EE 301 Linear Systems Analysis 3
- EE 341 Linear Analysis Laboratory 1
- EE 403 Fiber Optics Communication 3
- EE 418 Photonic Engineering 3
- EE 458 Photonic Engineering Laboratory 1
- Electives to be selected from the following list:..... 3
- EE 302, 307, 328.
- EE 342, 414, 443 are recommended additional courses.

 21

B.S. PHYSICAL SCIENCE

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

MAJOR COURSES

* = Courses satisfy General Education and Breadth requirements

ASTR 301 The Solar System or ASTR 302 Stars and Galaxies.....	3
Astronomy and/or earth science adviser approved elective	4
CHEM 127, 128, 129 General Chemistry (B.1.a.)* ...	4,4,4
CHEM 301 Biophysical Chemistry or CHEM 305 Physical Chemistry (B.1.a.)*	3
¹ CHEM 316 Organic Chemistry or CHEM 326 Organic Chemistry.....	4
¹ CHEM 328 Survey of Biochemistry or CHEM 371 Biochemical Principles	4
Chemistry adviser approved elective	4
GEOL 201 Physical Geology	3
Physical sciences adviser approved elective (300– 400 level) (Prospective teachers take PSC 424)	9
¹ PHYS 131, 132, 133 General Physics or PHYS 121, 122, 123 College Physics (B.1.a.)*	4,4,4
PHYS 211 Modern Physics I.....	4
Physics adviser approved elective.....	3
Physics adviser approved elective (300–400 level) ...	3
PSC 461, CHEM 461, or PHYS 461 Senior Project ...	2
	<hr/> 70

SUPPORT COURSES

* = Courses satisfy General Education and Breadth requirements

CSC 110 Computers and Computer Applications (F.1.)	3
MATH 141, 142, 143 Calculus I, II, III or MATH 131, 132, 133 Technical Calculus (B.2.)*	4,4,4
MATH/CSC/STAT 200-level electives	8
	<hr/> 23

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.

Additional GEB courses are listed under Major and Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202, (A.3.)	
ENGL 215/ENGL 218 (A.4.)	

Area B:	3
A minimum of 18 units is required; 15 of the units are in Major and Support	
Physical science (B.1.a.)* see Major Courses	
Life sciences elective (B.1.b.)	
Mathematics/statistics (B.2.)* see Support Courses	
Area C:	18
PHIL 230/PHIL 231 (C.1.)	
Critical reading electives (C.1.)	
Fine and performing arts elective (C.2.)	
Literature, philosophy, arts elective (300–400 level) (C.3.)	
Arts and humanities elective (Area C)	
Area D:	18
HIST 204 (D.1.)	
POLS 210 (D.1.)	
HIST 315 (D.2.)	
ECON 201/211/222 (D.3.)	
ANT 201/GEOG 150/SOC 105 (D.4.a.)	
ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
Area E:	5
PSY 201/PSY 202 (E.1.)	
BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
Area F:	3
A minimum of 6 units is required; 3 of the units are in Support	
Computer literacy (F.1.)* see Support Courses	
Technology elective (F.2.)	
Total.....	<hr/>
A minimum of 79 units is required; 18 of the units are in Major and Support	
	61

ELECTIVES..... 35

Students planning on qualifying for a teaching credential should contact the University Center for Teacher Education about necessary courses.

189

¹ A choice of the PHYS 121, 122, 123 sequence or CHEM 326 or CHEM 328 restricts the Physics and Chemistry electives available to the student later in this program.

STATISTICS DEPARTMENT

Faculty Office Building (47), Room 28A
(805) 756-2709

Faculty

Department Chair, Roxy L. Peck

James C. Daly	Richard J. Rossi
Jay L. Devore	Robert K. Smidt
John E. Groves	Kent D. Smith
Y. Leon Maksoudian	Sing-Chou Wu
John M. Rogers	

Programs

B.S. Statistics

Statistics Minor

The Statistics Department has two primary purposes—to offer introductory statistics courses to students from many different majors at Cal Poly, and to offer a curriculum of diverse statistics courses for those students pursuing a Bachelor of Science degree in Statistics.

In this age of high technology it has become increasingly easy to record and store information resulting from experiments, surveys, and historical studies. It is the responsibility of the professional statistician to determine the best ways to collect, summarize and analyze these data. Because of the increasing number of quantitative studies that are conducted in fields ranging from medicine to agriculture to business, the professional statistician is in great demand.

The National Science Foundation estimates that statistics is one of the few areas that will have more openings in the 1990's than there are individuals with degrees in that area. Recent graduates of the program at Cal Poly are working for companies in fields as diverse as insurance, aircraft manufacturing, banking, computer manufacturing, and pharmaceutical development.

The statistics degree program requires students to have a substantial amount of coursework in mathematics and computer science. With this basis the students take courses in the following statistics areas—analysis of variance, regression analysis, statistical use of computers, sampling methods, nonparametric analysis, multivariate analysis, and mathematical statistics. In the various courses the students make use of computer systems available at Cal Poly.

Throughout the program faculty encourage students to work on practical, realistic problems that require the understanding of all aspects of the data acquisition and analysis problem.

CURRICULUM FOR STATISTICS MINOR

Select one of the following introductory sequences *Units* 6–8

- STAT 211 Elementary Probability and Statistics (3), and STAT 212 Statistical Methods (3)
- STAT 251 Statistical Inference for Mgmt. I (4), and STAT 252 Statistical Inference for Mgmt. II (4)
- STAT 321 Statistical Analysis I (3) and STAT 322 Statistical Analysis II (4)

Select from the following 9

STAT 313 Applied Experimental Design and Regression Models (3) or STAT 323 Analysis of Variance (3)
STAT 324 Applied Regression Analysis (3)
STAT 330 Statistical Uses of Computers (3)

Select from any 400-level STAT course 6

Select six units from the following content areas with approval of Statistics Department Minor Coordinator. 6

Sample Survey
Design of Experiment
Multivariate Techniques
Quality Control
Regression
Special Topics

27-29

B.S. STATISTICS

Courses are displayed by Major, Support, General Education and Breadth, and Electives.

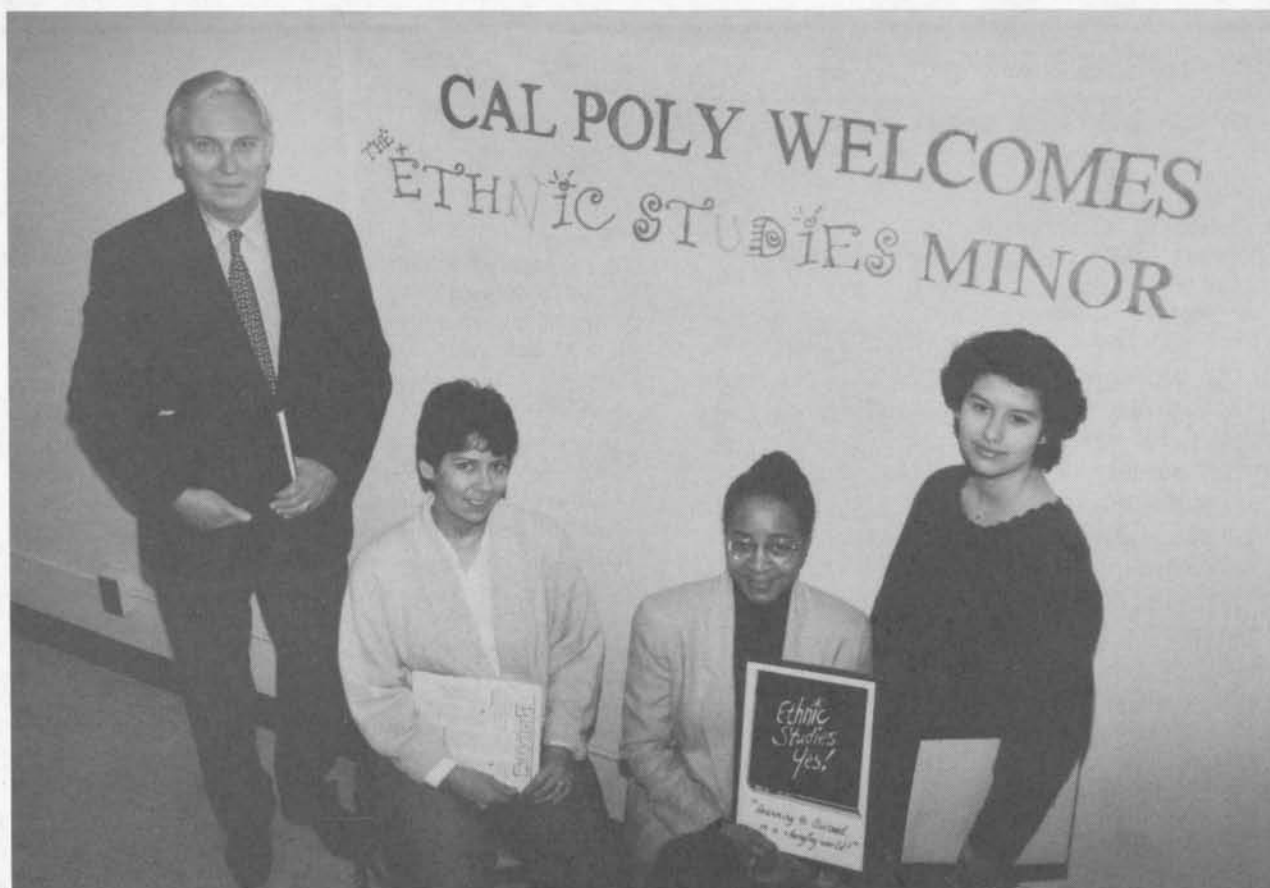
	Units		
MAJOR COURSES		Area B:	10
* = Courses satisfy General Education and Breadth requirements		A minimum of 18 units is required; 8 of the units are in Major	
CSC 332 Numerical Analysis I	3	Physical and life sciences electives (one each, one with lab) (B.1.)	
MATH 141 Calculus I (B.2.)*	4	Physical or life science elective (B.1.)	
MATH 142 Calculus II (B.2.)*	4	Mathematics/statistics (B.2.)* see Major Courses	
MATH 143 Calculus III	4	Area C:	18
MATH 206 Linear Algebra I	4	PHIL 230/PHIL 231 (C.1.)	
MATH 241 Calculus IV	4	Critical reading electives (C.1.)	
STAT 321 Statistical Analysis I	3	Fine and performing arts elective (C.2.)	
STAT 322 Statistical Analysis II	4	Literature, philosophy, arts elective (300–400 level) (C.3.)	
STAT 323 Analysis of Variance	3	Arts and humanities elective (Area C)	
STAT 324 Applied Regression Analysis	3	Area D:	18
STAT 330 Statistical Uses of Computers	3	HIST 204 (D.1.)	
STAT 423 Linear Models	3	POLS 210 (D.1.)	
STAT 425 Probability Theory and Applications I	3	HIST 315 (D.2.)	
STAT 426 Probability Theory and Applications II	3	ECON 201/211/222 (D.3.)	
STAT 427 Mathematical Statistics	3	ANT 201/GEOG 150/SOC 105 (D.4.a.)	
STAT 461 Senior Project	2	ANT/BUS/ECON/GEOG/POLS/SOC/WS elective (300–400 level) (D.4.b.)	
STAT 462 Senior Project	2	Area E:	5
STAT 463 Undergraduate Seminar	2	PSY 201/PSY 202 (E.1.)	
Statistics electives (400 level)	12	BIO 220/FSN 210/PE 250/PSY 304/REC 100 (E.2.)	
	<hr/>	Area F:	2
	69	A minimum of 6 units is required; 4 of the units are in Major	
SUPPORT COURSES		Computer literacy (F.1.)* see Major Courses	
* = Courses satisfy General Education and Breadth requirements		Technology elective (F.2.)	
CSC 118 Fundamentals of Computer Science I (F.1.)	4	Total	<hr/>
CSC 201/CSC 204/CSC 218	3	A minimum of 79 units is required; 12 of the units are in Major and Support	67
MATH 242 Differential Equations	4		
MATH 248 Methods of Proof in Mathematics	4	ELECTIVES	14
MATH electives to be selected with adviser's approval from: MATH 306, 335, 336, 406, 412, 431, 437.	6		<hr/>
Adviser approved technical electives	15		186
	<hr/>		
	36		

GENERAL EDUCATION AND BREADTH

Please see page 77 for selection of GEB electives. At least 12 units must be at the 300–400 level.

Additional GEB courses are listed under Major and Support Courses.

Area A:	14
ENGL 114 (A.1.)	
ENGL 125/PHIL 125/SPC 125 (A.2.)	
SPC 201/SPC 202 (A.3.)	
ENGL 215/ENGL 218 (A.4.)	



A NEW ERA IN ETHNIC STUDIES AT CAL POLY

With this catalog Cal Poly offers a new minor in Ethnic Studies. Students from all majors can benefit from Ethnic Studies courses. The approach is comparative and inclusive enabling students to learn more about their own ethnic heritage and its relation to the broader ethnic heritage of California, the United States, and the larger global community. *Photo (l-r): Dr. Robert Gish, Director and Professor; Yolanda Tiscareno, Secretary; Dr. Willi Coleman, Professor; and Irasema Garcia, student. Photo by Doug Allen.*

ETHNIC

STUDIES

Ethnic Studies

English Building, Room 201
(805) 756-1707

Faculty

Director, Robert F. Gish

Willi Coleman

Program

Ethnic Studies Minor

Ethnic Studies is interdisciplinary. Courses in Ethnic Studies seek a broader understanding of the various cultural characteristics of diverse groups of people, including their origins, diaspora, and other ethnic and cultural classifications. Courses in Ethnic Studies involve race, language, artistic, literary, historical, political, economic, and mythic traditions and contexts as well as issues of class, gender, and social values and mores. Ethnic Studies is a discipline which proceeds from assumptions that the human condition is diverse and complex and that "truths" about culture are best achieved from a variety of approaches.

Ethnic Studies at Cal Poly is a developing program which seeks to integrate aspects of the arts and the science, technology and society, the humanities and general education. Although housed in the College of Liberal Arts, the scope of Ethnic Studies extends to the other colleges and the larger university and society. Its curricular and social missions attempt to reinforce democratic and egalitarian principles.

ETHNIC STUDIES MINOR

The Ethnic Studies Minor provides students with interdisciplinary understanding of various cultural and other identifying characteristics of diverse groups of people, including their origins and diaspora. Ethnic Studies examine race, language, artistic, literary, historical, political, economic, and mythic perceptions as well as issues of class, gender, social mores, folkways, and values.

Students completing the minor have an appreciation of cultural diversity and the contributions of ethnic groups to American history and culture. They understand issues of culture, race, gender, racism, stereotyping, and discrimination. Students gain a knowledge of historical trends and strategies for addressing contemporary issues. Finally, students improve their abilities to deal with issues and people with sensitivity and responsibility, use critical thinking skills, nurture tolerance, and celebrate diversity.

	<i>Units</i>
Core courses (12)	
ES 110 Introduction to Ethnic Studies.....	3
ES 114 Racism and American Culture.....	3
ES 210 U.S. Cultural Heritage	3
ES 320 Cultural Images	3
Adviser approved electives	15
Electives will reinforce and enhance student's understanding of issues of culture, race, and gender. A minimum of 11 units must be 300–400 level.	



EDUCATION BUILDING

The recently remodeled building houses the University Center for Teacher Education. *Top photo by Stephen Hughes; view from the stairway looking out at campus. Bottom photo by Doug Allen; entrance to the building.*



University

Center

for

TEACHER

EDUCATION

University Center for Teacher Education

Education Bldg. (02), Room 121
(805) 756-2583

Faculty

Director, Susan Roper

MaryLud Baldwin	Donald K. Maas
Donald Cheek	Susan L. McBride
Leonard Davidman	Patricia A. Mulligan
Patricia Davidman	Dennis M. Nulman
Erland G. Dettloff	Kenneth F. Palmer
Howard Drucker	Bernard A. Troy
Robert L. Levison	

The following faculty participate with the University Center for Teacher Education and hold academic rank in a department outside the Center :

Doris Acord	Susan Duffy
Frederick P. Andoli	Robert A. Flores
Kathleen Balgley	Alan W. Holz
John Battenburg	Robert L. Inchausti
Lloyd N. Beecher	William C. Kellogg
C. Andrea Brown	Sarah S. Lord
Carl R.V. Brown	Joseph E. Sabol
Glen R. Casey	H. Bernard Strickmeier
Robert S. Cichowski	

Programs

M.A. in Education

with Specializations in:
Counseling and Guidance
Curriculum and Instruction
Educational Administration
Reading
Special Education

Credential Programs

The University Center for Teacher Education is designed to promote an all-University approach toward teacher education and to develop a strong, collaborative, and enduring partnership with area school districts.

The Center offers a wide variety of courses and programs leading to careers in education. Common to all programs is a commitment to excellence, to cooperation and collaboration, to preparation for future educational challenges. As the state's population grows, enrollments in grades K-12 increase and with them the demand for teachers. New roles and responsibilities for highly competent teachers are

developing, and teaching can lead to specialist positions in administration, curriculum planning, counseling, special education, or reading. To meet the need for excellent teachers the Center seeks talented, creative students who are committed to a long-term career in education and to the improvement of educational processes and institutions.

The University Center for Teacher Education offers a Master of Arts degree in Education with a broad range of specializations and credential programs for qualified candidates. The M.A. in Education has areas of specialization in: Counseling and Guidance, Curriculum and Instruction, Educational Administration, Reading, and Special Education.

Credential programs include preliminary and professional clear teaching credentials in single and multiple subjects. Service and specialist credentials in Administrative Services, Pupil Personnel Services, Reading/Language Arts Specialist and Special Education Specialist (Learning Handicapped and Severely Handicapped) are also offered. To accommodate the working professional, courses are offered during the late afternoon and evening.

Stressing the "learn by doing" philosophy of Cal Poly, the University Center for Teacher Education provides opportunities for extensive student on-site observation and fieldwork. Cal Poly maintains cooperative relations with the surrounding school districts, and within our service area students can enjoy cross-cultural, urban and rural fieldwork. Additionally, the Center operates the Reading Clinic, providing diagnostic and remedial services for clients of school age.

MASTER OF ARTS DEGREE—EDUCATION

General Characteristics

The Master of Arts degree in Education is designed to provide both a broad-based perspective of education and increased competence in positions of special responsibility. The specializations are closely related to the occupational and professional requirements of a variety of vocational pursuits in the fields of education, counseling, college student affairs, and agencies involved with community affairs.

Program of Study

All programs require a minimum of 45 quarter units of acceptable graduate work, with at least 24 units of 500-level Education courses. Courses taken in these programs may also be applied toward related credentials.

The candidate must maintain a grade point average of 3.0 (B) or better in all coursework attempted subsequent to admission to postbaccalaureate standing. Calculation of the grade point average will include all grades, although only the courses with A, B, or C grades will be counted to satisfy requirements for the degree. Required courses with a D or F grade must be repeated in all M.A. programs. All candidates must meet the current Graduation Writing Requirement.

Credits earned in student teaching will not be accepted toward completion of any specialization within the Master of Arts in Education. At least 36 program-required quarter units shall be completed in residence. Transfer and/or extension credits will only be accepted when the credits are acceptable for master's degree credit by the offering institution in its own programs.

Depending on the specialization, final assessment of a candidate's progress shall include a comprehensive written examination and EDUC 590 Research Applications in Education, or the completion of a thesis/project. Students must enroll in EDUC 599 Thesis/Project (or EDUC 598) for every quarter in which they are receiving advisement.

Conditionally Classified Standing

The student may enroll in a graduate degree curriculum, if in the opinion of the appropriate campus authority, the student can remedy any deficiencies by additional preparation.

Classified Standing

For admission as a classified graduate student, a student shall have a minimum grade point average of 3.0 in the last 90 quarter units attempted. A student shall have earned an acceptable baccalaureate degree from a regionally accredited institution. Or, the student shall have completed equivalent academic preparation and have satisfactorily met the professional, personal, scholastic, and other standards for graduate study, including qualifying examinations, as the appropriate university authorities may prescribe. Only those applicants who show promise of success and fitness will be

admitted to the graduate degree program, and only those who continue to demonstrate a satisfactory level of scholastic competence and who possess appropriate personal qualities will be eligible to continue in such a program.

Advancement to Candidacy

Advancement to master's degree candidacy requires completion of a minimum of 24 quarter units of program-required courses in residence, specified in a formal program of study, with a minimum grade point average of 3.0 and the formal recommendation of the specialization faculty. Students must maintain a minimum grade point average of 3.0 in all coursework included on the formal program of study, and in all coursework completed subsequent to admission to postbaccalaureate standing.

M.A. EDUCATION, SPECIALIZATION IN COUNSELING AND GUIDANCE

The Master of Arts degree in Education with a Counseling and Guidance Specialization is designed to prepare students for careers in public or private school counseling or student affairs work in higher education. Admission to the program requires references, an autobiographical statement, and an interview. Pupil Personnel Services (PPS) Credential candidates must meet credential requirements of the State of California. Only six quarter units of fieldwork experience will apply toward the M.A., although additional fieldwork will be required to meet PPS credential and student affairs requirements. Student affairs candidates must include EDUC 562 in their formal program of study. EDUC 590 and a comprehensive written examination or EDUC 599 are required for degree completion. Courses taken in this program may be applied toward a fifth-year study for a clear teaching credential. Candidates whose goals are for clinical counseling careers in agency settings or in private practice should refer to the Master of Science degree program in Psychology in the Psychology and Human Development Department.

	<i>Units</i>
Education Core	13
EDUC 587 Educational Foundations and Current Issues (4)	
EDUC 588 Education, Culture and Learning (4)	
EDUC 589 Research Methods and Analysis in Education (5)	
Required in the Area of Specialization	29
EDUC 555 Counseling and Communication (4)	
EDUC 556 Ethnic Counseling (4)	
EDUC 557 Career Development (4)	
EDUC 560 Counseling Theories and Assessment (4)	
EDUC 561 Group Counseling (3)	
EDUC 573 Field Experience–Counseling (6)	
¹ EDUC 590 Research Applications in Education (4)	
Electives (to be selected with adviser's approval).....	6
	<hr/> 48

M.A. EDUCATION, SPECIALIZATION IN CURRICULUM AND INSTRUCTION

The Curriculum and Instruction Specialization aims at expanding the candidate's instructional skills and knowledge of curriculum at the elementary and/or secondary level. Candidates may want to improve their skills as classroom teachers; they may choose to enter positions as resource teachers, curriculum specialists, or instructional team leaders; or they may seek employment in the private sector in curriculum and training related positions. Courses taken in this program may be applied toward a fifth year of study for a clear teaching credential. In addition to the general prerequisites, applicants must have successfully completed student teaching or the equivalent prior to entering the program.

EDUC 590 and a comprehensive written examination, or EDUC 599, are required for the completion of a master's degree with a specialization in curriculum and instruction.

	<i>Units</i>
Education Core	13
EDUC 587 Educational Foundations and Current Issues (4)	
EDUC 588 Education, Culture and Learning (4)	
EDUC 589 Research Methods and Analysis in Education (5)	
Required in Area of Specialization	27
EDUC 501 Problems and Practices in Curriculum Development (3)	
EDUC 503 Seminar in Language Arts Curriculum and Methods (3)	
EDUC 504 Seminar in Science and Mathematics Curriculum and Methods (4)	
EDUC 505 Seminar in Social Studies Curriculum and Methods (3)	
EDUC 506 Models of Instruction (4)	
EDUC 507 Instructional Materials and Technology (3)	
EDUC 532 Adv. Field Experiences in Education (3)	
¹ EDUC 590 Research Applications in Education (4)	
Electives (selected with adviser's approval).....	5
(Suggested Electives: EDUC 427, 440, 450, 470, 480, 511, 512, 513, 515, 526, 529, 555, PE 422)	

 45

¹ If EDUC 599 Thesis/Project is selected in lieu of EDUC 590, student must register for credit each quarter of advisement.

M.A. EDUCATION, SPECIALIZATION IN EDUCATIONAL ADMINISTRATION

This program is designed for career candidates in educational administration. It emphasizes a comprehensive knowledge of educational administration including applied theory of administration and leadership, schools in contemporary society, and effective management related to educational outcomes. While designed for career school administrators, the program can be helpful for administrators in other fields. EDUC 590 and a comprehensive written examination, or EDUC 599, are required for completion of a masters degree with a specialization in Educational Administration.

Work in this program may be applicable to an Administrative Services Credential (See credential programs).

	<i>Units</i>
Education Core	13
EDUC 587 Educational Foundations and Current Issues (4)	
EDUC 588 Education, Culture and Learning (4)	
EDUC 589 Research Methods and Analysis in Education (5)	
Required in the Area of Specialization	12
EDUC 512 Educational Organization and Management (4)	
EDUC 513 Educational Planning Decision Making (4)	
¹ EDUC 590 Research Applications in Education (4)	
Electives (to be selected with adviser's approval).....	20
Suggested electives: EDUC 501, 510, 511, 514, 515, 516, 518, 542.	
	45

M.A. EDUCATION, SPECIALIZATION IN READING

The Master of Arts degree in Education with a specialization in Reading is designed to present the candidate an opportunity for advanced preparation in reading. Graduate students not meeting minimum standards may appeal for special consideration to the Reading Assessment Committee.

EDUC 590 and a comprehensive written examination, or EDUC 599, are required for the completion of a master's degree with a specialization in reading.

	<i>Units</i>
Education Core	13
EDUC 587 Educational Foundations and Current Issues (4)	
EDUC 588 Education, Culture and Learning (4)	
EDUC 589 Research Methods and Analysis in Education (5)	
Required in Area of Specialization	19
EDUC 525 Reading Processes, Programs, and Technology (4)	
EDUC 526 Diagnosing and Remediating Reading Problems (4)	

EDUC 530 Secondary, College, and Adult Reading Practices (4)

EDUC 532 Advanced Field Experiences in Education (3)

¹ EDUC 590 Research Applications in Education (4)

Electives (to be selected with adviser's approval) 13
Suggested electives: EDUC 529, 531.

45

M.A. EDUCATION, SPECIALIZATION IN SPECIAL EDUCATION

The Master of Arts degree with a specialization in Special Education is an academic program that offers the student an opportunity for advanced learning in Special Education. Applicants must meet personal and professional standards, including necessary qualifying examinations, presentation of personal recommendations, and a personal interview.

Units for the master's degree program can be applied towards the requirements for a clear single or multiple subjects teaching credential. It is also possible for the qualified student to complete the requirements for the Specialist Credential while pursuing the requirements for the Master of Arts degree in Education.

EDUC 590 and a comprehensive written examination, or EDUC 599, are required for the completion of the Master's degree with a specialization in Special Education.

	<i>Units</i>
Education Core	13
EDUC 587 Educational Foundations in Current Issues (4)	
EDUC 588 Education, Culture and Learning (4)	
EDUC 589 Research Methods and Analysis in Education (5)	
Required in Area of Specialization	11
EDUC 547 Atypical Learning Patterns (4)	
EDUC 553 Current Issues in Special Education (3)	
¹ EDUC 590 Research Applications in Education (4)	
Electives (to be selected with adviser's approval)	21
	45

¹ If EDUC 599 Thesis/Project is selected in lieu of EDUC 590, the student must register for credit each quarter of advisement.

Teaching Credential Programs

University Center for Teacher Education Services Center
Education Bldg. (02), Room 120
(805) 756-2126

The Teaching Credential Programs consist of coursework and field experiences, including student teaching, required to obtain the Preliminary and Professional Clear Multiple and Single Subject teaching credentials in California. Guidelines for all credentials are established by the State of California's Commission on Teacher Credentialing (CTC), and are subject to change.

Cal Poly is authorized by the Commission on Teacher Credentialing to prepare candidates and recommend for the following credentials:

Basic Credentials

(Preliminary and Professional Clear)

Multiple Subject Instruction (as commonly practiced in California elementary and middle schools)
 Crosscultural Language and Academic Development (CLAD) Emphasis
 Bilingual Crosscultural Language and Academic Development (BCLAD) Emphasis
 Single Subject Instruction (as commonly practiced in California high schools and most junior high schools)
 Agriculture
 English (and Speech Communication)
 Home Economics
 Life Science (Biology)
 Mathematics
 Physical Education
 Physical Science (Chemistry and Physics)
 Social Science (History and Political Science)

Advanced Credentials

Specialist Credentials (Clear)

Adapted Physical Education Specialist
 Agriculture Specialist
 Reading/Language Arts Specialist
 Special Education
 Learning Handicapped Specialist, and
 Severely Handicapped Specialist

Services Credentials

Administrative Services (Preliminary and Professional)
 Pupil Personnel Services (School Counseling)

The teaching credential programs typically take four or five quarters to complete depending on completed prerequisites. Applications are accepted during specific periods at the

beginning of each Fall, Winter and Spring quarters (for these dates contact the University Center for Teacher Education Services Center). Detailed information about other requirements can be found in the credential handbooks, "The Guide to the Multiple Subject, CLAD/BCLAD Credential Program" and "Single Subject Teaching Credential Handbook," which are available at the Services Center. Further information, requirements and procedures for entering a particular credential program may be obtained from the appropriate credential program adviser. The Master of Arts in Education section of this catalog contains additional information regarding graduate degree programs which may coincide with credential programs.

Candidates for the single subject teaching credential in Agriculture or the Agricultural Specialist credential complete their preparation program through the Agricultural Education Department at Cal Poly. For further information or advisement students should communicate with the head of the Agricultural Education Department.

CLAD and BCLAD

Cal Poly's Crosscultural Language and Academic Development (CLAD) and Bilingual Crosscultural Language and Academic Development (BCLAD) programs stress knowledge of language structure acquisition and development; methodologies for English language development and specially designed content instruction delivered in English; and general cultural concepts relevant to Education.

Additionally, BCLAD is designed to prepare teachers for bilingual classrooms. The BCLAD emphasis focuses on knowledge of bilingual teaching methodologies, the Latino culture, and proficiency in Spanish.

Multiple and Single Subject Teaching Credential Program

Admission Requirements

- admission to Cal Poly as a postbaccalaureate student,
- required cumulative GPA (see below),
- evidence of taking the California Basic Educational Skills Test (CBEST),

- evidence of passing the Multiple Subject Assessment for Teachers Examination or an approved Waiver (coursework) statement, and
- evidence of application for Certificate of Clearance (Multiple Subject only).

The requirements for admission to Cal Poly to pursue a Multiple Subject credential differ slightly from those for the Single Subject credential. Details concerning specific credential program admission requirements are available from the appropriate adviser, and in the advisement handbook.

Admission to the university does not guarantee admission to the teacher education program.

Admission to the Teaching Credential Program – Step I

To enter the credential program and to identify additional requirements that must be completed prior to beginning student teaching, a "Step I" application is to be submitted at least two quarters before student teaching (not including summer quarter). For most credential candidates this is done upon completion of the baccalaureate degree or during the first quarter of postbaccalaureate studies. Check with your credential program adviser and the credential handbook to be sure that all requirements are completed.

Minimum Scholarship Standards for Admission to Teaching Credential Programs

Discipline Division	Minimum GPA 1992-94
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Note: GPA's are subject to change.

Single Subjects:

Agriculture	2.50
Biological Sciences	2.72
Education (includes Physical Education and Industrial Arts)	2.69
Home Economics (includes Child Development)	2.68
English (includes Speech)	2.80
Mathematics	2.72
Physical Sciences (includes Chemistry and Physics)	2.66
Social Sciences (includes History and Political Science)	2.90
Multiple Subjects	2.94

The candidate shall have a grade point average in the upper half of undergraduate students in the candidate's discipline division. The candidate's GPA shall be based on the cumulative work attempted at Cal Poly. In the absence of at least 45 quarter units of work attempted at Cal Poly, the GPA shall be based on cumulative work attempted at all colleges and universities. It is the prerogative of the major department to require a GPA which exceeds the mandated minimum standard. *These GPA's are subject to change.*

Step I Requirements:

Refer to most recent student handbook for specifics.

- Completion of an approved early field experience;
- a Certificate of Clearance;
- letters of recommendation;
- a professional aptitude interview with adviser;
- evidence of competency in oral reading, writing and speaking English;
- evidence of freedom from rubella and tuberculosis; and
- evidence of mathematics competency (Multiple Subject candidates only).
- students must demonstrate the personality and character appropriate to standards for the teaching profession.

Admission to Student Teaching – Step II

Student teaching consists of two consecutive quarters in public school classrooms, under the supervision of a cooperating teacher and a university supervisor. Application for student teaching assignments must be made by Monday of the fourth week of the quarter before one plans to student teach. Applicants must pass CBEST prior to receiving a student teaching assignment.

Multiple Subject student teaching consists of two full-time all day experiences with the student teacher gradually assuming responsibility for the class.

Single Subject student teaching involves a six unit and a twelve unit assignment. Six unit student teaching consists of a part-time (half day) experience in the classroom observing and teaching. Twelve unit student teaching consists of a full-time all day experience with the student teacher gradually assuming responsibility for the class.

Application for the Preliminary or Professional Clear Credential

Upon completion of Cal Poly's Teaching Credential Program (Multiple or Single Subject) each student must apply for their Preliminary or Professional Clear Credential. These applications are available through the University Center for Teacher Education Services Center and may be submitted as early as two weeks prior to completing the final credential requirements. See the credential handbooks for more information.

Professional Clear Credential – Fifth Year of Study

To qualify for the Professional Clear Multiple or Single Subject credential candidates must complete the following requirements *beyond* the Preliminary credential

requirements. This is also referred to as the Fifth Year of Study.

- 45 quarter units of adviser approved postbaccalaureate coursework;
- coursework in *Health Education* (PE 250, PE 305, and verification of completion of a training program in cardiopulmonary resuscitation (CPR) (American Red Cross Community CPR or American Heart Association Level B);
- coursework in *Special Education* (EDUC 440, 4 units);
- coursework in *Computer Education* (EDUC 480, PE 350, MATH 300, or AGED 410), and
- recommendation from a California college or university with a CTC approved Teacher Preparation Program.

Passing the California Basic Education Skills Test (CBEST) is required for all credentials.

Minimum GPA Requirements

Students may enter the credential program as an undergraduate or as a postbaccalaureate candidate. The minimum GPA which must be maintained each quarter after admission to the program for undergraduate candidates is the same as their required admission GPA (see above table).

Postbaccalaureate candidates must maintain a 3.00 quarterly GPA. The required grade point averages must be maintained in both the professional education coursework (see Credential Program Handbook for specific courses) and all other coursework attempted after admission to the credential program.

ADVANCED CREDENTIALS

Advanced credential candidates must maintain a grade point average of 3.0 (B) or better in all credential required coursework. Calculation of the grade point average will include grades received in all classes required for the credential, although only courses with A, B, or C grades will be counted to satisfy credential requirements.

Administrative Services

The Educational Administration program offers two credential programs, one leading to recommendation for the Preliminary Administrative Services Credential, the second leading to recommendation for the Professional Administrative Services Credential.

The preliminary program is designed to prepare candidates for the Preliminary Administrative Services Credential which authorizes service in any administrative position at any grade level. It requires 44 quarter units, most of which are applicable to the Master of Arts degree with a Specialization in Educational Administration.

In consonance with the Master of Arts program, the credential program emphasizes a comprehensive knowledge of public school administration including applied theory of administration and leadership, schools in contemporary society, and effective management related to educational outcomes.

The credential emphasizes applied theory with actual experience in fieldwork assignments and an evaluation of administrative competence as a basis for credential recommendation.

The professional credential program prepares candidates for the Professional Administrative Services Credential. This program requires 36 quarter units of work, a minimum of 12 units of which must be advanced fieldwork, and 18 units must be appropriate coursework. Candidates must hold a Preliminary Administrative Services Credential.

The program emphasizes advanced skill development in building-level or central office administration with emphasis on the job application of management skills.

For credential recommendation the candidate must, in addition to completing the program of study, have had two years of successful administrative experience and meet program competency review criteria.

For more information regarding this program, contact the Coordinator, Educational Administration program, University Center for Teacher Education.

Pupil Personnel Services

The Pupil Personnel Services Credential (PPS) is designed to prepare students for counseling and guidance positions in public and private schools in grades K-12. This program stresses applied theory and practical, direct experiences to prepare pupil personnel candidates. A low student-adviser ratio allows for personalized attention. The PPS Credential program has excellent fieldwork placements in K-12 public schools including career centers, continuation schools, and special classes. Required courses are generally offered in late afternoons and evenings.

For more information regarding this program, contact the Coordinator, Counseling and Guidance, University Center for Teacher Education.

Reading/Language Arts Specialist

The Reading/Language Arts Specialist Credential program is designed to supplement the basic multiple subject or single subject credential. The Reading/Language Arts Specialist Credential permits the holder to function as a Reading Supervisor, Reading Specialist or Reading Teacher in grades K-12. In order to qualify for admission to the program the candidate must hold a valid Multiple Subject or Single Subject Preliminary or Life Credential; and have completed a reading methods course or the equivalent. The Reading/Language Arts Specialist Credential program requires two years of full-time teaching experience and successful

completion of a final assessment examination before the credential can be awarded.

For more information, contact the Coordinator, Reading/Language Arts, University Center for Teacher Education.

Special Education Specialist

The Special Education Specialist program is designed to prepare teachers for two advanced credentials: the Learning Handicapped Credential, and the Severely Handicapped Credential. These credentials enable the teacher to work with students ages 3–21, with mild, moderate and/or severe problems in a variety of settings. The unit requirement for the credential allows the full-time student to complete the requirements in one year. The Special Education program emphasizes a practical orientation to teaching.

In order to be admitted to the program, a candidate must have a baccalaureate degree from an accredited institution, and should have a preliminary teaching credential that is valid in California. Applicants must also meet general personal and professional standards determined by an admission interview and recommendations. Generic courses are open to undergraduate students as per university guidelines.

Units for the Specialist Credential may be applied towards the requirements for a Clear Single or Multiple Subjects teaching credential. It is also possible for qualified students to complete the requirements for the Master of Arts degree in Education while pursuing the Specialist Credential.

Learning Handicapped Specialist Credential

This program is designed to give students the competencies needed to teach mildly handicapped students ages 3–21. This program stresses practical skills across a wide variety of areas. The Learning Handicapped Specialist Credential may be combined with the Reading/Language Arts Specialist Credential.

Severely Handicapped Specialist Credential

This program is designed for those who wish to teach students ages 3–21 with severe handicaps including the trainable mentally retarded, severely emotionally disturbed, autistic, and multiple handicapped. The training emphasis is upon functional curriculum planning, integration into least restrictive environments, vocational preparation, and community living skills.

The Severely Handicapped Specialist Credential may be combined with the Learning Handicapped Specialist Credential.

For more information regarding this program, contact the Coordinator, Special Education, University Center for Teacher Education.

COURSES

COLLEGES, DEPARTMENTS AND COURSE PREFIXES

COLLEGE OF AGRICULTURE

Agriculture	AG
Agribusiness	AGB
Agricultural Education	AGED
Agricultural Engineering	AE, ASM
Animal Sciences and Industry	ASCI, PM, VS
Crop Science	CRSC, FRSC, VGSC
Dairy Science	DSCI
Food Science and Nutrition	FSN
Military Science	MSC
Natural Resources Management	FNR, REC
Ornamental Horticulture	OH
Soil Science	SS

COLLEGE OF ARCHITECTURE AND ENVIRONMENTAL DESIGN

Environmental Design	EDES
Architectural Engineering	ARCE
Architecture	ARCH
City and Regional Planning	CRP
Construction Management	CM
Landscape Architecture	LA

COLLEGE OF BUSINESS

Graduate Studies—Business	GSB
Accounting	ACTG
Business Administration	BUS, FIN, MKTG
Economics	ECON
Industrial Technology	IT
Management	MGT, MIS

COLLEGE OF ENGINEERING

Engineering	ENGR
Engineering Technology	EET, ET, ETME, ETWT
Aeronautical Engineering	AERO
Civil and Environmental Engineering	CE, ENVE
Computer Engineering	CPE
Computer Science	CSC
Electronic and Electrical Engineering	EE
Industrial and Manufacturing Engineering ..	IME
Materials Engineering	MATE
Mechanical Engineering	ME

COLLEGE OF LIBERAL ARTS

Humanities	HUM
Women's Studies	WS
Art and Design	ART
English	ENGL
Foreign Languages and Literature	FORL, FR, GER, ITAL, SPAN
Graphic Communication	GRC
History	HIST
Journalism	JOUR
Liberal Studies	LS
Music	MU
Philosophy	PHIL, RELS
Political Science	POLS
Psychology and Human Development	HD, PSY
Social Sciences	ANT, GEOG, SOC, SOCS
Speech Communication	SPC
Theatre and Dance	DANC, TH

COLLEGE OF SCIENCE AND MATHEMATICS

Science and Mathematics	SCM
Biological Sciences	BACT, BIO, BOT, CONS, ZOO
Chemistry	CHEM
Mathematics	MATH
Physical Education	PE
Physics	ASTR, GEOL, PHYS, PSC
Statistics	STAT

ETHNIC STUDIES

Ethnic Studies	ES
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UNIVERSITY CENTER FOR TEACHER EDUCATION

Education	EDUC
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ATHLETICS	PEM, PEW
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COURSE DESCRIPTIONS

Courses are listed alphabetically by prefix abbreviation. Prefixes and page numbers on which they begin are listed below.

Some courses will be shown as cross-listed in the title line. These courses cannot be repeated for credit under the separate prefixes.

All credits are in quarter units. Cal Poly operates on a four quarter system.

<i>PREFIX</i>	<i>TITLE</i>	<i>PREFIX</i>	<i>TITLE</i>
ACTG	Accounting	FORL	Foreign Language
AE	Agricultural Engineering	FR	French
AERO	Aeronautical Engineering	FRSC	Fruit Science
AG	Agriculture	FSN	Food Science and Nutrition
AGB	Agribusiness	GEOG	Geography
AGED	Agricultural Education	GEOL	Geology
ANT	Anthropology	GER	German
ARCE	Architectural Engineering	GRC	Graphic Communication
ARCH	Architecture	GSB	Graduate Studies—Business
ART	Art	HD	Human Development
ASCI	Animal Science	HIST	History
ASM	Agricultural Systems Management	HUM	Humanities
ASTR	Astronomy and Astrophysics	IME	Industrial and Manufacturing Engineering
BACT	Bacteriology	IT	Industrial Technology
BIO	Biology	ITAL	Italian
BOT	Botany	JOUR	Journalism
BUS	Business	LA	Landscape Architecture
CE	Civil Engineering	LIB	Library
CHEM	Chemistry	LS	Liberal Studies
CM	Construction Management	MATE	Materials Engineering
CONS	Conservation	MATH	Mathematics
COOP	Cooperative Education	ME	Mechanical Engineering
CPE	Computer Engineering	MGT	Management
CRP	City and Regional Planning	MIS	Management Information Systems
CRSC	Crop Science	MKTG	Marketing
CSC	Computer Science	MSC	Military Science
DANC	Dance	MU	Music
DSCI	Dairy Science	OH	Ornamental Horticulture
ECON	Economics	PE	Physical Education
EDUC	Education	PEM	Physical Education Men
EDES	Environmental Design	PEW	Physical Education Women
EE	Electronic and Electrical Engineering	PHIL	Philosophy
EET	Electronic Engineering Technology	PHYS	Physics
ENGL	English	PM	Poultry Management
ENGR	Engineering	POLS	Political Science
ENVE	Environmental Engineering	PSC	Physical Science
ET	Engineering Technology	PSY	Psychology
ES	Ethnic Studies	REC	Recreation Administration
ETME	Engineering Technology—Mechanical	RELS	Religious Studies
ETWT	Engineering Technology—Welding	SCM	College of Science and Mathematics
FIN	Financial Management	SOC	Sociology
FNR	Forestry and Natural Resources	SOCS	Social Sciences
		SPAN	Spanish
		SPC	Speech Communication
		SS	Soil Science
		STAT	Statistics
		TH	Theatre
		VGSC	Vegetable Science
		VS	Veterinary Science
		WS	Women's Studies
		ZOO	Zoology

ACTG-ACCOUNTING

ACTG 211 Financial Accounting for Nonbusiness Majors (4)

Introduction to financial accounting theory and practice with an emphasis on financial statement preparation and analysis. Not open to Business majors. 4 lectures.

ACTG 224 Financial Accounting (5)

Principles of financial accounting for Business majors. The course prepares students to read and interpret financial statement information. Financial reporting standards are explored to give students an understanding of how financial transactions and events are reflected in financial statements. 5 lectures. Prerequisite: Sophomore standing.

ACTG 225 Managerial Accounting (4)

Applications of accounting to management decision-making, planning and control including cost behavior, budget preparation, performance reporting, motivational and behavioral considerations, and ethics. 4 lectures. Prerequisite: MATH 221, STAT 252, ECON 222, CSC 120 or equivalent, and ACTG 211 or ACTG 224 or consent of instructor.

ACTG 302 Microcomputer Applications in Accounting (2)

Microcomputer applications in accounting. Advanced electronic spreadsheets, including integration with word processing and database software. Selection and use of accounting software on microcomputers. 1 lecture, 1 activity. Prerequisite: ACTG 211 or ACTG 224 and CSC 120 or equivalent.

ACTG 304 Tax Accounting (4)

Federal income taxation of individuals. 4 lectures. Prerequisite: ACTG 211 or ACTG 224 or consent of instructor.

ACTG 321, 322, 323 Intermediate Accounting I, II, III (4) (4) (4)

Comprehensive coverage of financial reporting. 321 covers financial statements, assets, leases, and long-term debt. 322 covers revenue recognition, income taxes, pensions, liabilities, equities, accounting changes, and cash flows. 323 covers accounting for inflation, international accounting, interim and segment reporting, special measurement problems, financial disclosures and analysis. 4 lectures. Prerequisite: 321: ACTG 224 and junior standing; 322: ACTG 321 with minimum grade of C-; 323: ACTG 322 with minimum grade of C-.

ACTG 400 Special Problems for Advanced Undergraduates (1-4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Junior standing and consent of instructor.

ACTG 402 Advanced Cost Accounting (4)

Product costing systems including hybrid costing systems, management control systems, cost allocation, activity based costing, cost information for decision making, new manufacturing environment, backflush costing and strategic control systems. International dimension integrated in the course content. 4 lectures. Prerequisite: ACTG 225.

ACTG 404 Taxation of Partnerships, Estates and Trusts and Complex Capital Transactions (4)

Federal income taxation of sales and exchanges, Subchapter S corporations, partnerships, estates and trusts. Federal gift and estate taxes. 4 lectures. Prerequisite: ACTG 304.

ACTG 405 Corporate Tax Accounting and Tax Administration (4)

Federal income taxation of regular corporations, tax research, tax administration, and IRS practice. 4 lectures. Prerequisite: ACTG 304.

ACTG 421 Accounting for Business Combinations (2)

Concepts and techniques of accounting for various forms of business combinations including acquisitions, mergers, and consolidations. Emphasis is placed on the preparation of consolidated financial statements for acquisitions classified as purchases and poolings-of-interests. 2 lectures. Prerequisite: ACTG 323 with minimum grade of C-, or consent of instructor.

ACTG 422 Accounting for Governments and Not-For Profit Entities (2)

Accounting concepts and techniques used by state and local units of governments and private not-for-profit entities. Emphasis is placed on the accounting and reporting practices of state and local units of governments. 2 lectures. Prerequisite: ACTG 321 with minimum grade of C-, or consent of instructor.

ACTG 423 Financial Reporting by Public Companies (2)

A study of the Securities and Exchange Commission and its reporting requirements. Emphasis is placed on the Commission's regulation of accounting, reporting, internal controls, and auditing. Impact on accountants' legal liability is also examined. 2 lectures. Prerequisite: ACTG 323 with minimum grade of C-, or consent of instructor.

ACTG 431 Professional Accounting (4)

Development of the accounting profession. Past, present and future. Emphasis on contemporary issues confronting the professional accountant and his/her social and ethical responsibilities and opportunities. 4 lectures. Prerequisite: ACTG 323 with minimum grade of C-, or consent of instructor.

ACTG 446 Auditing (4)

Survey of the auditing environment including institutional, ethical, and legal liability dimensions. Introduction to audit planning, assessing materiality and audit risk, collecting and evaluating audit evidence, considering the internal control structure, substantive testing, and reporting. 4 lectures. Prerequisite: ACTG 323 with minimum grade of C-, or consent of instructor. Recommended: MIS 221.

ACTG 447 Advanced Auditing (4)

Advanced coverage of selected topics including assessing materiality and audit risk, applying nonstatistical and statistical sampling, auditing computerized accounting systems, performing other attestation and accounting services, and researching auditing problems. 3 lectures, 1 activity. Prerequisite: ACTG 446. Recommended: MIS 321.

ACTG 461 Senior Project (1)

Provides practice in using primary research sources and materials in accounting and auditing. Original authoritative sources used include professional standards, academic journals, and computerized data bases. 1 seminar.

Prerequisite: ACTG 323, senior standing, and completion of graduation writing requirement.

ACTG 462 Senior Project (3)

Selection and analysis of a problem under faculty supervision. Problems typical of those which graduates must solve in their fields of employment. Formal report is required. Minimum 90 hours total time. Prerequisite: ACTG 461.

ACTG 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ACTG 500 Individual Study (1–4)

Advanced study planned and completed under direction of departmental faculty member. Open only to graduate students demonstrating ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head.

AE–AGRICULTURAL ENGINEERING**AE 121 Agricultural Mechanics (2)****GEB F.2.**

Identification and use of tools and materials; shop safety; tool sharpening and care; concrete mixes and materials; simple electric wiring; metal work; pipe fitting; basic woodworking; estimating quantities and costs. Students are required to meet safety regulations in laboratory work. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 1 laboratory.

AE 128 Introduction to Fundamentals of Agricultural Technology (3)

Introduction to agricultural engineering and agricultural engineering technology. Career opportunities. Problem solving techniques. Selection of materials for fabrication. Laboratory skills development in wood, metal, concrete, plumbing and projects in creative design. Strength tests of wood joints and concrete. Performance test of student design projects. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: MATH 116 or equivalent, high school drafting or concurrent enrollment in AE 133 or ETME 131.

AE 133 Agricultural Drafting (3)

Technical drawing oriented toward working drawings of agricultural engineering components and systems. Freehand sketching and instrument techniques. Multiview projection and pictorial drawings. Not open for credit to students with previous college level drafting course work. 1 lecture, 2 laboratories.

AE 143 Power and Machinery (4)

Performance of tractors and machinery. Evaluation of tillage, planting, and harvesting operations. Analysis and development of optimum mechanical systems. Use of microcomputers for evaluation, analysis, and report

presentation. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: AE 128, MATH 116 or equivalent.

AE 151 CAD for Agricultural Engineering (1)

Computer aided drafting on the Macintosh or similar computer using Autocad software. Drawing setup. 2-D projections including automatic dimensioning and hatching. Isometric construction, drawing layers, library symbols. Use of 3-D drawing software. 1 laboratory. Prerequisite: ETME 142 or equivalent.

AE 200 Special Problems for Undergraduates (2–4)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

AE 232 Agricultural Structures Planning (3)

Environmental factors affecting crop storage structures and animal housing. Insulation, heating, ventilation, water supply, and waste disposal. Functional planning of production systems. Application of solar energy to agriculture. 2 lectures, 1 laboratory. Prerequisite: AE 128, PHYS 132 and college drafting.

AE 236 Principles of Irrigation (4)

Land grading design, operation, management, and evaluation of irrigation methods. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: MATH 141, AE 237, SS 121, a computer programming course.

AE 237 Engineering Surveying I (2)

Use and care of tapes, levels, transits, and electronic distance measuring instruments (EDMI). Keeping field notes, measurements by tape. Differential and profile leveling. Turning angles and determining directions of lines. Map reading. 1 lecture, 1 laboratory. Prerequisite: MATH 119 or an understanding of trigonometric functions.

AE 238 Engineering Surveying II (2)

Traverses by theodolite. Adjustments, coordinates, and area calculations. Earthwork and landgrading. Topographic mapping. Triangulation and trilateration using electronic distance measurement. Horizontal and vertical curve layout. 1 lecture, 1 laboratory. Prerequisite: AE 237.

AE 240 Agricultural Engineering Laboratory (1–2)

Individual projects. Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 or 2 laboratories. Prerequisite: Consent of instructor.

AE 312 Hydraulics (4)

Static and dynamic characteristics of liquids, flow in open and closed channels, uniform and nonuniform flow, flow measurement, pumps. 3 lectures, 1 laboratory. Prerequisite: PHYS 132, ME 211.

AE 321 Agricultural Safety (3)

Principles of agricultural safety. Accident causation and prevention, hazard identification and abatement, laws and regulations. Machinery, electrical, chemical, livestock, shop and fire safety. Rural crime prevention and safety program development. 3 lectures. Prerequisite: Junior standing.

AE 326 Energy Systems for Agriculture (3)

Theory and application of energy sources and systems. Covering such sources as heat systems, biomass, direct energy conversion, and power application to the soil. 2 lectures, 1 laboratory. Prerequisite: AE 143, ME 211, ME 302. ME 302 may be taken concurrently.

AE 328 Measurements and Computer Interfacing (3)

Transducers and engineering measurements in agricultural engineering. Transducer characteristics, signal processors and controllers, instrumentation techniques and the use of the computer in the measurement interface. 2 lectures, 1 laboratory. Prerequisite: CSC 251, EE 311.

AE 331 Irrigation Theory (3)

Plant-water-soil relations using evapo-transpiration, plant stress, soil moisture deficiency, frequency and depth of irrigation, salinity, infiltration, drainage and climate control. Miscellaneous course fee required—see *Class Schedule*. 3 lectures. Prerequisite: AE 236, SS 121, MATH 141 or consent of instructor.

AE 337 Landscape Irrigation (3)

Design of landscape irrigation systems including soil factors, hydraulics, site information, selection of system components, back flow prevention, plumbing codes and cost estimating. 2 lectures, 1 laboratory. Prerequisite: SS 121 or consent of instructor.

AE 339 Agricultural Mechanics Skills (2)

Advanced shop skills. Carpentry, electricity, plumbing, surveying, power mechanics, tractor equipment operation and maintenance. 2 lectures, 2 laboratories weekly for five weeks per session—two sessions per quarter. Prerequisite: Agricultural teacher candidates starting/returning from student teaching, senior or graduate standing or consent of instructor.

AE 340 Irrigation Water Management (4) GEB F.2.

Soil-plant-water relationships, evapotranspiration rates and irrigation schedules. Water quality, salinity and drainage. Water rights and irrigation institutions. Water measurement. For non-AE majors only. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: MATH 118, SS 121, or consent of instructor.

AE 345 Aerial Photogrammetry and Remote Sensing (3)

Object recognition, three-dimensional equipment, and interpretation. Print alignment, stereoscopic viewing, scales, elevation determination, and application. Application of aerial photos to regional studies. 2 lectures, 1 laboratory. Prerequisite: MATH 116.

AE 348 Energy for a Sustainable Society (3)

Transition from fossil-fuel to renewable energy sources including hydro, biomass, solar, wind, and energy conservation. Environmental, economic, and political consequences of a renewable energy-based sustainable society. 3 lectures. Prerequisite: Junior standing, GEB B.1. course.

AE 399 Graphical Interface Computing in Agriculture (1)

Macintosh or similar computer and available software as an effective educational tool. Applications of word processing, spreadsheets, graphics, drawing/drafting, data base and some

basic programming to the problems and designs encountered in the Agricultural Engineering and Agricultural Engineering Technology programs. 1 laboratory. Prerequisite: AG 250 or ARCH 250 or CSC 251.

AE 400 Special Problems for Advanced Undergraduates (2–4)

Individual investigation, research, studies, or surveys of selected problems in agriculture. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

AE 403 Agricultural Systems Engineering (3)

Engineering principles combined with mathematical optimization techniques to evaluate parameters in agricultural production and processing systems. Project planning techniques, linear and nonlinear modeling, response surface methodology. 2 lectures, 1 laboratory. Prerequisite: CSC 251, IME 314, MATH 242, STAT 321.

AE 405 Chemigation (1)

Fertilizer and chemical injection through irrigation systems. Hardware, fertilizer compounds, and distribution uniformity. Matching chemicals and equipment to specific irrigation methods. Miscellaneous course fee required—see *Class Schedule*. 1 laboratory. Prerequisite: AE 236 or AE 340, SS 121.

AE 414 Irrigation Engineering (4)

Design of on-farm irrigation systems; micro, surface, and sprinkler irrigation systems; canals and pumps; economic and strategies of pipe design; pipeline protection. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: AE 331 or AE 340; hydraulics.

AE 415 Hydrology (3)

Collection, organization and use of precipitation and runoff data, flood frequency and economics of structures, stream gauging and use of hydrograph, principles of groundwater management and flood routing. 3 lectures. Prerequisite: MATH 141 or consent of instructor.

AE 421 Equipment Engineering (4)

Design and construction of specialized agricultural components and equipment. 2 lectures, 2 laboratories. Prerequisite: CE 205, ME 212, IME 142.

AE 422 Equipment Engineering (3)

Design and construction of specialized agricultural components and equipment. 2 lectures, 1 laboratory. Prerequisite: AE 421.

AE 425 Computer Controls for Agriculture (3)

Computer activated controls as applied to agricultural machinery, agricultural structures, processing and irrigation industries. Encompassing control logic to evaluate stability behavior of systems of computer interfacing, data input and control output. 2 lectures, 1 laboratory. Prerequisite: ASM 324, CSC 110 or AG 250.

AE 427 Agricultural Process Engineering (3)

Agricultural engineering principles applied to air, water, air-water mixtures, drying, heating, refrigeration, fluid flow, size

reduction, fan laws and materials handling. 2 lectures, 1 laboratory. Prerequisite: AE 312, AE 333, ME 302.

AE 430 Finite Element Analysis (3)

Introduction to the theory of finite element analysis and its application to drainage, pipe flow, fruit and vegetable damage predictions, structural strength, heat transfer, and other agricultural engineering applications. 2 lectures, 1 laboratory. Prerequisite: CE 204, MATH 242, ME 302.

AE 433 Agricultural Structures Design (4)

Structural analysis and design of agricultural service and processing buildings. Emphasis on use of wood, metals, and reinforced concrete in light construction. 3 lectures, 1 laboratory. Prerequisite: AE 232, CE 205.

AE 435 Drainage (3)

Flow of water in porous media. Intrinsic permeability and hydraulic conductivity. Flow nets, wells and ground water, design of sub-surface drains. 2 lectures, 1 laboratory. Prerequisite: AE 312, AE 331, or AE 340 or SS 432 and consent of instructor.

AE 437 Conservation Engineering (3)

Engineering solutions of soil and water conservation problems. Applications of engineering fundamentals of hydraulics, hydrology, and soils used in the design and construction of soil and water conservation structures. 2 lectures, 1 laboratory. Prerequisite: AE 312, AE 415, SS 121, or consent of instructor.

AE 440 Agricultural Irrigation Systems (4)

On-farm irrigation system evaluation and management. Drip, micro-spray, furrow, border strip, sprinkler systems. Irrigation efficiency and uniformity. Pumping costs. For non-AE majors only. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: SS 121 or consent of instructor.

AE 446 Geographic Information Data Sources (2)

Techniques for preparing data for geographic information systems. Digital data from surveying, aerial photographs, satellite imagery, and government data sources will be entered, displayed, and edited using computer software and translated for use in other software packages. 1 lecture, 1 laboratory. Prerequisite: AE 237 or AE 131, and GEB F.1. computer literacy course.

AE 448 Bioconversion (3)

Thermal mechanics and physical techniques for converting biomass into useful energy forms for agriculture and industry. Laboratory exercises include experiments with methane and alcohol production and combustion of agricultural residue. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: MATH 117 or equivalent, or consent of instructor.

AE 450 Advanced Graphical Interface Computing (1)

Macintosh or similar computer as an effective intellectual tool. Applications in problem solving, project planning, numerical analysis, advanced word processing, spreadsheets and modeling. Communications and data transfer. 1 laboratory. Prerequisite: AE 399 or equivalent.

AE 461, 462 Senior Project (2) (3)

Solution of an engineering problem in agriculture. Involves research methodology: problem statement, analysis, synthesis project design, construction (when feasible), and evaluation. Project requires 150 hours with a minimum of faculty supervision.

AE 464 Professional Practice (3)

Contracts, specifications, and legal aspects of agricultural engineering. Safety and human factors. Engineering ethics and professional registration. 3 lectures. Prerequisite: Senior standing.

AE 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 lectures. Prerequisite: Consent of instructor.

AE 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 laboratories. Prerequisite: Consent of instructor.

AE 492 Pumps and Pump Drivers (3)

Pump characteristics and system head. Net positive suction head. Series and parallel operation. Pump contracts and protection. Selection of pumping systems for different water sources. Design of pump intakes for surface water supplies. Driver selection. Servicing motors and engines. Hand pumps and wind mills. 2 lectures, 1 laboratory. Prerequisite: Senior standing.

AE 500 Individual Study (1–3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of instructor.

AE 521 Engineering of Agricultural Systems (4)

Problem solving by analyzing the need, establishing boundaries and developing creativity. Examples worked through in practicability analysis, transportation problems, linear programming and system analysis with an emphasis on optimum system operation. 3 lectures, 1 laboratory. Prerequisite: Consent of instructor.

AE 522 Instrumentation Control/Microprocessors (4)

Engineering input/output instrumentation for sensing and controlling functions through data acquisition, analysis and response to agricultural processing. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: BASIC language programming or consent of instructor.

AE 529 Small Farm Mechanization (3)

Principles of farm machinery used for tillage, seeding, weeding, harvesting and transport of agricultural crops. Small-scale equipment, suitable for subsistence farming in developing countries. Small tractors, hand tools, animal power, and fuel from renewable sources. Miscellaneous

course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: AE 143 or equivalent, graduate standing, or consent of instructor.

AE 531 Water Wells (3)

Groundwater resources drilling methods and development of wells. Water well design for pollution prevention. Well rehabilitation. Destruction of abandoned wells. Design of domestic water systems. Water quality standards and water conditioning for different applications. 2 lectures, 1 laboratory. Prerequisite: Graduate standing.

AE 533 Irrigation Project Design (4)

Formation of water user associations and social/financial aspects of development of irrigation projects. Engineering solutions for improved water delivery and canal automation. Interaction between engineering and social factors. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: AE 340, consent of instructor.

AE 581 Graduate Seminar in Agricultural Engineering (3)

Group study of current problems of the agricultural engineering industry; current experimental and research findings as applied to field of agricultural engineering. *Class Schedule* will list topic selected. Total credit limited to 9 units. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

AERO—AERONAUTICAL ENGINEERING

AERO 102 General Aviation (3)

Fundamentals of aerodynamics and principles of flight. Introduction to power systems and instrumentation. Air navigation, interpretation of weather data, uses of flight computer, subjects covered in the private pilot's examination. Past, present and future of general aviation and its implications on society. Not acceptable as a technical elective for engineering students. Not open for technical credit to Aeronautical Engineering students. 3 lectures.

AERO 121 Aerospace Fundamentals (1)

Introduction to the engineering profession including the aeronautical and aerospace fields. Engineering approach to problem-solving and analysis of data obtained from experiments. Basic nomenclature and design criteria used in the aerospace industry. Applications to basic problems in the field. 1 laboratory.

AERO 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

AERO 210 History of Aviation (3)

History of technological innovations which led to modern aviation. People and circumstances that contributed to the major breakthroughs in aeronautics and astronautics. Impact of aviation on society. Discussion of current events in aviation. 3 lectures.

GEB F.2.

AERO 215 Aerospace Engineering Analysis I (2)

Introduction to problem solving techniques in aerospace engineering using digital computers. Primary emphasis on the solution of problems in aerodynamics, aerospace structures, performance, stability and control, and astronautics. 2 laboratories. Prerequisite: CSC 251, MATH 143.

AERO 240 Additional Engineering Laboratory (1–2) (CR/NC)

Total credit limited to four units, with not more than two units in any one quarter. Credit/No Credit grading. 1 or 2 laboratories.

AERO 301, 302, 303 Aerothermodynamics (5) (5) (3)

Properties and characteristics of fluids, fluid statics and dynamics, the thermodynamic relations, laminar and turbulent subsonic flows as applied to flight vehicles. Introduction to heat transfer. 5 lectures, fall and winter; 3 lectures, spring. Prerequisite: ME 211, MATH 242.

AERO 304 Experimental Aerothermodynamics (2)

Laboratory experiments verify the momentum and energy equations. Fan performance, boundary layer measurements, diffuser performance, heat transfer and solar collector performance experiments are evaluated. 1 lecture, 1 laboratory. Prerequisite: ENGL 218. Concurrent: AERO 302.

AERO 306 Aerodynamics I (3)

Introduction to theoretical aerodynamics. Primary emphasis in the subsonic region. Basic aerodynamic theory: Airfoil theory, wing theory, lift and drag. Structure of atmosphere, air speed indicators, static and dynamic flight performance. 3 lectures. Concurrent: AERO 302.

AERO 307 Wind Tunnel and Flight Test Laboratory (3)

Wind tunnel testing of basic aerodynamic properties of airfoils, finite wings, aircraft models, and aircraft flight performance. Emphasis on both static and dynamic responses of aircraft. Various measurement techniques, data reduction schemes, and analysis methods. 1 lecture, 2 laboratories. Prerequisite: AERO 302, AERO 306, ENGL 218.

AERO 315 Aerospace Engineering Analysis II (3)

Analysis methods for aerospace engineering problems. Applications of analysis methods to solving problems in aerodynamics, aerospace structures, stability and control, and astronautics. 3 lectures. Prerequisite: AERO 215, MATH 242.

AERO 320 Fundamentals of Guidance and Control (3)

Introduction to state-space and transfer function models for aircraft, missiles, and helicopters. Elementary classical and modern analysis techniques using interactive computer graphics. 3 lectures. Prerequisite: AERO 215. Concurrent: AERO 315.

AERO 330 Stress Analysis (4)

Basic strain, stress and equilibrium equations. St. Venant torsion theory. Rotating discs. Theory of plates and shells. Beams on elastic foundation. Theories of failure. Introduction to modern fatigue analysis and fracture mechanics. 4 lectures. Prerequisite: MATH 242, CE 204, CE 205.

AERO 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

AERO 401 Propulsion Systems (4)

Power plant types, components, characteristics, and requirements. Principles of thrust and energy utilization. Thermodynamic processes and performance of turboprop, turboshaft, turbofan, turbojet, ramjet, and rocket engines. 3 lectures, 1 laboratory. Prerequisite: AERO 302, AERO 306, CHEM 124.

AERO 404 Gas Dynamics (3)

Fundamental theory of one dimensional gas dynamics: Isentropic flow, flow in converging-diverging nozzles, shock propagation, normal and oblique shock theory, Prandtl-Meyer expansions, Fanno line flow, and measurement methods. 3 lectures. Prerequisite: AERO 302.

AERO 405 Aerodynamics II (3)

Review of gas dynamics, shock-wave and boundary-layer interaction, compressible subsonic and transonic flows over airfoils, 2-dimensional supersonic flows around thin airfoil, finite wing in supersonic flow. 3 lectures. Prerequisite: AERO 306, AERO 404.

AERO 406 Hypersonic Flow Theory (3)

Theoretical and analytical methods for the high-speed flight of aerospace vehicles. Review of gas dynamics, local surface inclination methods, inviscid methods, boundary layer and aerodynamic heating, and viscous interactions. 3 lectures. Prerequisite: AERO 306, AERO 404.

AERO 407 Reentry Aerodynamics (3)

Near planet environments. Transition from orbital to aerodynamic motion. 3 lectures. Prerequisite: AERO 406. Concurrent: AERO 451.

AERO 409 Flight Test (3)

Principles of flight testing with applications to performance, stability and control, and avionics system test. Data analysis and presentation. Test planning and principles of in-flight simulation. 1 lecture, 2 laboratories. Prerequisite: AERO 306, AERO 320.

AERO 416 Principles of Rotary Wing Flight (3)

Introduction to analysis of rotary wing aircraft. Overview of avionics systems. Performance figures of merit. Stability and control of helicopters. Equations of motion for forward flight. 3 lectures. Prerequisite: AERO 306 and AERO 315.

AERO 418 Fundamentals of Flight Simulation (3)

Overview of flight simulators and supporting facilities. Aircraft equations of motion and navigation equations with respect to the earth's surface. Ground, environmental, avionics systems models. Lab simulation and flight evaluation. 2 lectures, 1 laboratory. Prerequisite: AERO 320 or EE 301 or CSC 360 or ME 422.

AERO 420 Stability and Control of Aerospace Vehicles (4)

Steady-state and perturbed equations of motion for a rigid body in flight. Static and dynamic stability derivatives. Modes

of motion in response to control inputs. State-space and transfer function analysis. Introduction to feedback control. 4 lectures. Prerequisite: AERO 306 and AERO 320 or ME 212.

AERO 430 Aerospace Structural Analysis (4)

Deflection analysis. Principles of fictitious displacement, virtual work, unit load method. Energy methods: Dummy load method, Castigliano's theorem, Maxwell-Betti reciprocal theorem, minimal principles, Rayleigh-Ritz's method, Galerkin's method. The shear lag problem and the stability of structures. Numerical methods: Finite difference, finite elements method. 4 lectures. Prerequisite: AERO 315, AERO 330.

AERO 432 Experimental Stress Analysis (1)

Employing the knowledge of stress analysis and aerospace structural analysis in an individual and group design project dealing with aerospace structures. 1 laboratory. Prerequisite: AERO 430.

AERO 434 Structural Dynamics Analysis (4)

Fundamentals of structural dynamics and aeroelasticity of flight vehicles. Undamped and damped free and forced vibration of a single degree of freedom linear system. Free and forced response of multiple degrees of freedom linear systems. Vibration and forced response of continuous structures. Introduction to unsteady aerodynamic analysis methods. Lagrangian approach and Eigenvalue and Eigenvector methods. Finite element and vibrational analysis. 3 lectures, 1 laboratory. Prerequisite: AERO 306, AERO 315, and AERO 330.

AERO 443, 444, 445 Flight Vehicle Design (2) (4) (4)

Preliminary layout of a typical transport aircraft and a space vehicle using design and calculation techniques developed in previous aeronautical engineering courses. Design of selected component structures and preparation of necessary drawings. AERO 443: 2 laboratories. AERO 444 and AERO 445: 2 lectures, 2 laboratories. Prerequisite: AERO 306, AERO 330, senior standing. Concurrent: AERO 401, AERO 420.

AERO 447, 448, 449 Spacecraft Design (2) (4) (4)

Preliminary layout of typical space vehicle using design and calculation techniques developed in previous aeronautical engineering courses. Design of selected components and preparation of necessary drawings. AERO 447: 2 laboratories. AERO 448 and AERO 449: 2 lectures, 2 laboratories. Prerequisite: AERO 315, senior standing. Concurrent: AERO 401, AERO 420, AERO 451, AERO 430.

AERO 451 Orbital Mechanics I (3)

Motion of a body in the central force field. Space vehicle trajectories, guidance systems, power generators for interplanetary travel, structural loading, and principles of space vehicle design. 3 lectures. Prerequisite: ME 212.

AERO 452 Orbital Mechanics II (3)

Orbital motion, perturbing forces. Asphericity of the earth, aerodynamic drag, third-body tidal forces, etc. Encke and Cowell solution techniques. Restricted 3-body problem. Satellite attitude dynamics, rigid body-symmetric and asymmetric semirigid bodies. Attitude control, spinning/fixed

gravity gradient. Gyroscopic instruments. 3 lectures. Prerequisite: AERO 451.

AERO 461, 462 Senior Project (2) (3)

Selection and completion of a project which is typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 150 hours total time. Prerequisite: Senior standing.

AERO 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

AERO 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 laboratories. Prerequisite: Consent of instructor.

AERO 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

AERO 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

AERO 500 Individual Study (1–3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

AERO 515 Continuum Mechanics (3)

Rules of index notation and transformation laws of Cartesian tensors as applied to a continuous medium. Application of these methods to fluids and solids provides the student with a unified understanding of the fundamental laws of physics for a continuum. 3 lectures. Prerequisite: AERO 302, AERO 315, AERO 330, graduate standing or consent of instructor.

AERO 520 Theoretical Aerodynamics (3)

Fundamentals of analytic aerodynamics; potential flow, Kutta-Joukowski theorem, Schwarz-Christoffel transformation, lifting line theory, thin wing theory, three-dimensional lift and drag of wings, slender body theory. 3 lectures. Prerequisite: AERO 306, MATH 502, graduate standing or consent of instructor.

AERO 522 Boundary-Layer Theory (3)

Concept of boundary-layer. Boundary-layer equations, similarity transformation, integral methods for steady, two-dimensional laminar and turbulent boundary layers. 3 lectures. Prerequisite: AERO 302, graduate standing or consent of instructor. Concurrent: MATH 501.

AERO 523 Turbulence (3)

Flow physics of turbulence. Turbulence scales and structures. Reynolds equations. Vorticity dynamics. Energy production, convection, and dissipation. Similarity rules and turbulence modeling for jets, wakes, mixing and boundary layers. Effect of turbulence on noise, combustion, heat transfer, and flow control. 3 lectures. Prerequisite: AERO 302, graduate standing or consent of instructor.

AERO 526 Computational Fluid Dynamics I (3)

Classification of partial differential equations. Numerical methods for solving elliptic, parabolic, and hyperbolic sets of partial differential equations, including implicit and explicit methods. Consideration of accuracy, stability of numerical methods, and programming complexity. Fundamental equations of fluid dynamics and appropriate numerical solutions. 3 lectures. Prerequisite: CSC 311, AERO 303, graduate standing or consent of instructor.

AERO 527 Computational Fluid Dynamics II (3)

Application of computational techniques to solving fluid dynamic problems using potential equations, Euler's equation, boundary-layer equations, and Navier-Stokes equations. Grid generation. Turbulence modeling. 2 lectures, 1 laboratory. Prerequisite: AERO 526.

AERO 530 Inelastic Structural Analysis (3)

Inelastic stress analysis. Yield criteria. Strain hardening. Plastic straining and bending. Elastic-plastic problems. Plastic instability. Slip-line fields for plains. Plastic strain problems and analysis and introduction to viscoplasticity. 3 lectures. Prerequisite: AERO 430, graduate standing or consent of instructor.

AERO 532 Advanced Composite Structures Analysis and Design (4)

Review of isotropic material behavior. Behavior of unidirectional fiber composites. Properties of short-fiber composites, and orthotropic lamina. Analysis of laminated composites. Residual stresses and strains of composite. Strength and hygrothermal behavior of composite materials. Optimization design of pressure vessels. Bending, buckling, and vibration of laminated plates. Notched strength. Fatigue behavior and fracture mechanics of composite structure. 3 lectures, 1 laboratory. Prerequisite: AERO 330 or ME 327.

AERO 535 Advanced Aerospace Structural Analysis (3)

Advanced flight vehicle and fracture mechanics analysis and design. Fundamentals and applications of modern fatigue analysis in the aerospace industry. 3 lectures. Prerequisite: AERO 430, graduate standing or consent of instructor.

AERO 540 Elements of Rocket Propulsion (3)

Analysis and design of liquid and solid rockets using basic design parameters such as droplet atomization, droplet and particle combustion, heat transfer, combustion stability and control, and thermochemical computations. 3 lectures.

Prerequisite: AERO 401, AERO 404, graduate standing or consent of instructor.

AERO 541 Aircraft Gas Turbine Engines (4)

Aerothermodynamics of propulsion systems, characterization of power plant utilization and operation cycle analysis, on-off design performance, component characterization, component design, component matching, optimization, and introduction to power plant and airframe integration systems for aircraft. 4 lectures. Prerequisite: AERO 401 or ME 443, graduate standing or consent of instructor.

AERO 545 Non-Impulsive Orbit Design (3)

Review of ion chemical design, 2-body orbital mechanics, and expected perturbing forces. Emphasis on Encke methods of perturbed orbit determination. 1 lecture, 2 activities. Prerequisite: AERO 451.

AERO 550 Analysis and Design of Flight Control Systems (3)

Fundamental principles of flight control design for modern aircraft. Automatic control of aircraft and missiles. Selected advanced topics in computer analysis of control systems. 2 lectures, 1 laboratory. Prerequisite: AERO 420 or ME 422, graduate standing or consent of instructor.

AERO 551 Advanced Topics in Estimation and Control (3)

Principles of multi-loop analysis and design using state representations of actual systems. Optimal design for regulators and trackers. Observers and Kalman filter applications. Current research in robust control. 2 lectures, 1 laboratory. Prerequisite: AERO 420 or AERO 550 or ME 422, graduate standing or consent of instructor.

AERO 555 Flying Qualities and Flight Test of Piloted Vehicles (3)

Principles of flight test applied to handling qualities research. Flying qualities prediction from reduced-order models. Transfer function models for the pilot. Cooper-Harper scale, pilot-induced-oscillation, fly-by-wire systems, in-flight simulation and testing. 2 lectures, 1 laboratory. Prerequisite: AERO 550.

AERO 565 Advanced Topics in Aircraft Design (3)

Application of advanced analytic engineering methods to aircraft design problems. Analysis and synthesis of advanced topics related to design of aircraft. 3 lectures. Prerequisite: AERO 522, AERO 530 and AERO 550, graduate standing or consent of instructor. Concurrent: AERO 520.

AERO 570 Selected Advanced Topics (3)

Directed group study of selected topics for graduate students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

AERO 590 Graduate Seminar (1)

Current developments in the field of Aeronautical Engineering. Participation by students, faculty and guest lecturers. 1 two-hour seminar. Prerequisite: Graduate standing or consent of instructor.

AERO 599 Design Project (Thesis) (2) (2) (5)

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis.

Prerequisite: Graduate standing.

AG-AGRICULTURE

AG 100 Agriculture Enterprise Project (1-4) (CR/NC)

Selection and completion of a management/production project under faculty supervision. Project participation is subject to approval by the department head and the Cal Poly Foundation. Degree credit limited to 12 units. Registration is through department offices and subtopics will list the department supervising the project. Credit/No Credit grading only.

AG 124 Small Engines (2)

Operating principles of the small internal combustion engine. Maintenance and trouble-shooting applications of small power units to mowers and other landscape equipment. Repair procedures related to economic justifications. 1 lecture, 1 activity.

AG 201 Closed Circuit Hydraulics (3)

Selection, application and use of hydraulic components from manufacturer's specifications and literature. Use of standardized circuit design procedures with related calculation and selection criteria. 2 lectures, 1 laboratory. Prerequisite: AE 234.

AG 231 Agricultural Building Construction (3)

Development of practical skills in carpentry and light construction. Selection of materials. Agricultural buildings repaired, constructed, or modified during laboratory periods. 1 lecture, 2 laboratories. Prerequisite: AE 128 or consent of instructor.

AG 234 Agricultural Power Transmission and Mechanics (3)

Elements in the utilization and transmission of power in agricultural equipment. Emphasis on V-belt, roller chain, gear, and shaft drive. 2 lectures, 1 laboratory. Prerequisite: AE 142, PHYS 121.

AG 235 Agricultural Power (3)

Principles of spark ignition and compression ignition engines and related accessories. Service, trouble-shooting, and repair procedures. 1 lecture, 2 laboratories.

AG 241 Gasoline Engine Diagnosis (3)

Use of modern engine testing equipment in the evaluation of engine components and accessories such as: cylinder condition, ignition systems, electrical and electronic systems and fuel systems. 2 lectures, 1 laboratory. Prerequisite: AG 235.

AG 242 Diesel Fuel Systems (3)

Use of modern test and service equipment in evaluating and servicing diesel fuel systems. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: AG 235 or equivalent or consent of instructor.

AG 243 Competitive Intercollegiate Rodeo (2) (CR/NC)

Beginning through advanced skills in the event areas of college rodeo. Areas include saddle bronc, bareback, and bull riding; calf, team, and breakaway roping; steer wrestling, goat tying, and barrel racing. Minimum of 10 hours of laboratory per week. Total credit limited to 8 units. Credit/No Credit grading. Enrollment limited to those qualified to compete in intercollegiate rodeo. Consent of coach required.

AG 244 Project Analysis (5)

Analysis of projects for structural design, applied elements of statics, dynamics, strength of materials, fabrication, and fasteners. 3 lectures, 2 laboratories. Prerequisite: AE 133 or equivalent, PHYS 104, AG 234.

AG 245 Agricultural Equipment Projects (3)

Construction of special agricultural equipment related to any agricultural enterprise. 1 lecture, 2 laboratories. Prerequisite: AG 244.

AG 250 Computer Application to Agriculture (3) GEB F.1.

Microcomputers and commercial software used in agricultural industries. Word processing, spreadsheets, data base management programs, and programs applied to agriculturally oriented problems. Miscellaneous course fee required—see *Class Schedule*. 3 lectures.

AG 301 Agriculture and American Life (3) GEB F.2.

Relationship of agriculture and natural resources to man and his society. Impact of soil, water, and land uses on animal and crop production within the United States. Relative importance of resources used and commodities produced. Not open to students with majors in agriculture. 3 lectures. Prerequisite: Junior standing.

AG 339 Internship in Agriculture (1–12) (CR/NC)

Selected students will spend up to 12 weeks with an approved agricultural firm engaged in production or related business. Time will be spent applying and developing production and managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Credit/No Credit grading. Prerequisite: Consent of internship instructor.

AG 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

AG 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

AG 500 Individual Study (1–6)

Advanced independent study planned and completed under the direction of a member of the school faculty. Total credit limited to 6 units. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

AG 539 Graduate Internship in Agriculture (1–9)

Application of theory to the solution of problems of agricultural production or related businesses in the field. Analyze specific management problems and perform general management assignments detailed in a contract between the student, the firm or organization, and the faculty adviser before the internship commences. Degree credit limited to 6 units. Prerequisite: Consent of internship instructor.

AG 585 Cooperative Education Experience (6) (CR/NC)

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

AG 595 Cooperative Education Experience (12) (CR/NC)

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

AG 598 Reading and Conference (1–12) (CR/NC)

Systematic development of an agricultural thesis research project including literature searches, reports and experimental design. Repeatable for up to 12 units. Credit/No Credit grading only. Prerequisite: Graduate standing and instructor consent.

AG 599 Thesis (1–9)

Systematic research of a significant problem. Thesis will include problem identification, significance, methods, data analysis, and conclusion. Students must enroll every quarter in which facilities are used or advisement is received. Degree credit limited to 6 units. Prerequisite: Graduate standing and consent of instructor.

AGB—AGRIBUSINESS**AGB 101 Introduction to Agribusiness and Agricultural Economics (4)**

Understanding the breadth, depth and structure of the agribusiness industry. Introduction to the economic aspects of agriculture and their implications to the agricultural producer, consumer, and the food system. The role of agricultural resources, major agricultural resource issues, and their policy remedies. 4 lectures.

AGB 200 Special Problems for Undergraduates (1–2) (CR/NC)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a

maximum of 2 units per quarter. Credit can only be used to satisfy free electives. Credit/No Credit grading only.

Prerequisite: Consent of department head.

AGB 201 Agribusiness Sales and Service (3)

Emphasis on relationship selling focusing on building trust and providing valuable service. Critical skills of self-management, communication, and interpersonal values through role playing and presentations. Sales opportunities in the entire food industry surveyed, ranging from input industries such as seeds and fertilizers, to output industries such as produce and wine. 3 lectures.

AGB 212 Agricultural Economics (3)

Changes in agriculture and agricultural production in response to changing economic conditions. Optimum methods of agricultural production. Impact of technological change. Evaluating market structure and price formulating factors for agricultural products and inputs. 3 lectures. Prerequisite: AGB 101, ECON 201, or ECON 211.

AGB 213 Agricultural Economic Analysis (4)

Advanced agricultural microeconomics with emphasis on mathematical problem solving; production and cost functions, single and multiple input allocation, agricultural output combinations, agricultural market structures, and economies of size. 4 lectures. Prerequisite: AGB 212, MATH required for major.

AGB 300 Successful California Farms (2)

Visits to successful California farms involving many types of farming. Farm resources and organization, techniques of operation, yields, problems. Different regions visited on different trips. Miscellaneous course fee required—see *Class Schedule*. Can only be taken once for credit in the major. reported internship. Credit/No Credit grading. Prerequisite: Consent of internship instructor.

AGB 301 Agricultural Marketing (3)

Agricultural commodity marketing systems from farm to consumer. Middlemen types and marketing alternatives. Role of futures markets in pricing and risk minimization. Storage, transportation and grading systems. Selected topics such as foreign trade and marketing orders. 3 lectures. Prerequisite: AGB 212 or ECON 201 or ECON 212.

AGB 302 Agricultural Associations and Cooperatives (3)

Purpose, kinds, organization and management of agricultural cooperatives. Emphasis on California cooperatives, their characteristics, operation and future. One-day field trip visiting agricultural cooperatives included. 3 lectures. Prerequisite: AGB 301.

AGB 304 Agribusiness Marketing Management (3)

Marketing management applied to agricultural and food industries. Marketing concept, role of today's middlemen and growing importance of consumerism, ecology and conservation in today's changing market place. Exploration of marketing mix decisions including planning, product management, pricing, promotion and distribution. 3 lectures. Prerequisite: AGB 212 or ECON 201.

AGB 307 World Agricultural Resources (3)

World agricultural production areas with emphasis on natural and human resources, existing production, economic implications, population growth and potential food supply. 3 lectures. Prerequisite: AGB 212 or ECON 201 or ECON 211.

AGB 310 Agribusiness Credit and Finance (3)

Fundamentals of financing California's agribusiness industry. Principles of making investment decisions and costs of credit. Developing credit strategies within the framework of sources of credit and types of loans available to farms, ranches, and other agribusiness firms. 3 lectures. Prerequisite: One quarter of accounting or AGB 321.

AGB 312 Agricultural Policy (3)

Agricultural policy objectives and formulation, resource allocation and production adjustments. Survey of State and Federal agricultural policy and the trade policies of other countries as they influence the planning and practices of agribusiness. 3 lectures. Prerequisite: AGB 212 and ECON 222, or ECON 201 or ECON 211.

AGB 314 Fair Management (3)

Principles and procedures in organizing, managing and promoting fairs. Emphasis on California and Western fairs. Career opportunities, programs and problems in fair management and growth of fairs in America. A one-day field trip is required. 3 lectures. Prerequisite: Upper division standing.

AGB 315 Land Economics (3)

Supply of land, population pressure on land, input-output relations affecting land use, economic returns, land values, development and investment costs, locational factors, conservation, institutional factors, leasing, land use planning, taxation, public regulations. 3 lectures. Prerequisite: AGB 213 and ECON 222.

AGB 317 Agriculture-Consumer Relationships (3)

Basic facts, public opinion and ways of developing greater understanding of agriculture, its nature, characteristics, problems and relationship to nonfarm persons. Consumer education programs and procedures. Field trip is required. 3 lectures. Prerequisite: Upper division standing.

AGB 318 Agricultural Trade Policies (3)

Analysis of American trade policies and their relationship to agriculture. International trade pacts and their influence on agricultural production and marketing. 3 lectures. Prerequisite: AGB 213, AGB 312, and ECON 222.

AGB 321 Farm Records (4)

Fundamentals of record keeping, kinds of records, inventory, depreciation, payrolls, cash and accrual basis of income tax reporting, financial statements and analysis. 3 lectures, 1 activity. Prerequisite: AG 250 or equivalent, upper division standing.

AGB 322 Principles of Farm Management (4)

Organization and operation of farm and ranch businesses. Identification of factors affecting profitability. Evaluation of the business for increased efficiency and profit. Application of budgeting to laboratory farms and independent analysis of a farm. 3 lectures, 1 activity. Prerequisite: AGB 321 or ACTG

211, AGB 212, a course in the plant sciences, and a course in the animal sciences.

AGB 323 Agribusiness Managerial Accounting (4)

Agribusiness management with an emphasis on using accounting procedures that will provide useful information in making management decisions, setting objectives, and controlling operations. 3 lectures, 1 activity. Prerequisite: ACTG 211.

AGB 324 Agricultural Property Management and Sales (4)

Economic, legal and real estate principles in the investment, development, mortgaging and transferring of agricultural real estate. 3 lectures, 1 activity. Prerequisite: AGB 310 or consent of instructor.

AGB 326 Farm Appraisal (4)

Methods of farm appraisal, use of county records, appraisal practice on different types of farms, discussions with professional appraisers. 3 lectures, 1 activity. Prerequisite: AG 250 or equivalent, and upper division standing.

AGB 331 Farm Accounting (4)

Application of commercial accounting process to farm and ranch accounting problems. Emphasis on accounting systems that facilitate financial statement presentation, tax preparation and ADP enterprise analysis. Income tax laws pertaining to agriculture. 3 lectures, 1 activity. Prerequisite: ACTG 211.

AGB 336 Commodity Markets in Agribusiness (4)

Commodity market history, performance, and use in management of agribusiness. Techniques of analysis, hedging, speculation with applications to the agricultural business firm. 4 lectures. Prerequisite: AGB 212 and ECON 222, or consent of instructor.

AGB 360 Agribusiness Research Methods (3)

Concepts of research methodology and data presentation in agribusiness. Emphasis on advanced computer applications to problems in the field. Selection of methodology compatible with the problem. 3 lectures. Prerequisite: STAT 212 and AG 250.

AGB 400 Special Problems for Advanced Undergraduates (1-2) (CR/NC)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Credit can only be used to satisfy free electives. Credit/No Credit grading only. Prerequisite: Consent of department head or instructor.

AGB 401 Managing Cultural Diversity in Agricultural Labor Relations (4)

Agricultural labor trends and problems as determined by changes occurring in farming and farm related industries. Labor-management relations in agriculture; principles and procedures in organizing and managing the agricultural business personnel program. 4 lectures. Prerequisite: Senior standing.

AGB 405 Agribusiness Marketing Research Methods (3)

Collecting, tabulating and analyzing data for use in market research and sales. Techniques for determining market potential. Surveys, trends, correlation, market factor derivation, test marketing. Routing techniques, sampling

procedures. 3 lectures. Prerequisite: AG 250, MKTG 301, AGB 213, STAT 212.

AGB 406 Agribusiness Marketing Planning (4)

Client centered course where self-managed teams develop agribusiness marketing plan. Emphasis on developing presentation skills. Integration of marketing mix, particularly promotional elements in developing agribusiness marketing strategy emphasized. 4 lectures. Prerequisite: AGB 405.

AGB 409 California Agricultural Law (3)

Historical and current sources of law, examination of judicial systems, application of contracts, agency, labor law, torts, property and water law, partnerships, corporations and corporate finance applicable to agricultural enterprises. 3 lectures. Prerequisite: BUS 207, senior standing or consent of instructor.

AGB 410 Management Practices in Agricultural Lending (4)

Structure and performance of the agricultural lending industry. Advanced agricultural loan analysis and risk assessment. Agricultural loan documentation, securitization of farm loans, and farm bankruptcy. Exploration of interest rate impacts on agricultural lending. 4 lectures. Prerequisite: ACTG 211, AGB 310 and senior standing.

AGB 412 Advanced Agricultural Policy (4)

Agricultural resource allocation issues with emphasis on policies that impact the production of food and fiber and inputs used in their production. Special topics in agricultural resource allocation stressing issues and policies emphasizing economic externalities. 4 lectures. Prerequisite: AGB 312, AGB 315, and AGB 421 or AGB 433.

AGB 418 U.S. and Asia Pacific Agricultural Trade (3)

Agricultural infrastructures and trade policies of major U.S. trading partners in the Asia Pacific region. Particular emphasis on Japan's influence on California agricultural trade. Cultural and geo-political influences on the development of agricultural policy in the Asia Pacific region. 3 lectures. Prerequisite: AGB 318 or consent of instructor.

AGB 421 Agribusiness Operations Analysis (4)

Principles and procedures in agricultural business operations analysis and research. Evaluation of programs and problems to achieve optimal decisions. Production and financial data, statistics, pricing, costs, inventories, production level, and plant expansion or contraction. 3 lectures, 1 activity. Prerequisite: AG 250, AGB 213, STAT 212.

AGB 427 Agricultural Estate Planning (3)

Principles and procedures in agricultural estate planning and conservation. Determining beneficiary needs, assets, valuation, and taxes. Utilizing wills, property transfers, gifts, insurance, business continuation agreements, trusts and other tools in estate planning. 3 lectures. Prerequisite: Upper division standing.

AGB 433 Agricultural Price Analysis (3)

Application of statistical tools for price analysis. Emphasis on price making process for specific agricultural commodities. Utilization of market reports and production estimate data in

price forecasting and analysis. 2 lectures, 1 activity. Prerequisite: AG 250, AGB 213, STAT 212.

AGB 435 Linear Programming in Agriculture (3)

Application of linear programming to modern commercial agriculture; assumptions and data requirements; graphic and simplex solutions; preparation, coding and solutions of models simulating current problems. 2 lectures, 1 activity. Prerequisite: AG 250, AGB 213, AGB 322.

AGB 440 Field Studies in Agribusiness (2)

Visitation to selected agribusinesses. Organization, operation, services and problems considered. Miscellaneous course fee required—see *Class Schedule*. Prerequisite: Senior standing or consent of instructor. Can only be taken once for credit in the major.

AGB 445 Produce Marketing (2)

Directed group study of fresh fruit and vegetable marketing. Includes analysis of terminal markets, retail marketing (supermarkets, farmer's markets, roadside stands), limited preserving and ripening, grading and inspection, economics of transportation, international marketing. 2 seminars. Prerequisite: Senior standing and AGB 301.

AGB 446 Wine Market Analysis (2)

Application of statistical theory to collection and interpretation of production/sales data. Also includes introduction to forecasting and decision theory. Financial ratios and industry averages. 2 seminars. Prerequisite: AGB 301 or consent of instructor.

AGB 447 Wine Distribution and Pricing (2)

Wine distribution channels with emphasis on agents, brokers, distributors, and retailers. Inventory management and distribution cooperatives. Domestic and international shipping regulations. The impact of price on distribution will be highlighted. 2 seminars. Prerequisite: AGB 304 or consent of instructor.

AGB 448 Governmental Wine Regulations and Compliance (2)

Legal aspects of wine marketing. Emphasis on federal (BATF) requirements as well as the operation and/or use of state tax laws and state monopolies that tend to restrict the free movement of wine. 2 seminars. Prerequisite: Consent of instructor.

AGB 449 Wine Promotion and Packaging (2)

All types of mass media promotional strategies and complete coverage of the following areas: personal selling, publicity, public relations, direct marketing, and direct promotions. Label design, packaging, and point of sale promotions. Ethics for responsible advertising. 2 seminars. Prerequisite: AGB 446 or consent of instructor.

AGB 450 Agribusiness Strategy Formulation (4)

Development of strategy for farms and farm related businesses where uncontrollable environment makes output and results highly unpredictable; emphasis on the total enterprise. Case analysis. 4 lectures. Prerequisite: Senior standing and AGB 323.

AGB 455 Advanced Fair Management Seminar (2)

Advanced studies in fair management with emphasis on budgets, contracts, entertainment, carnivals, exhibit programs, crowd control, master planning maintenance. 2 seminars. Prerequisite: AGB 314.

AGB 456 Crop Management Problems (4)

Management problems of crop farms and orchards. Crop enterprise costing procedures, equipment costing and replacement, scheduling of operations to obtain efficiencies. Determination of most profitable rotations and levels of input use. Includes whole farm budget development and analysis. 3 lectures, 1 activity. Prerequisite: AGB 322.

AGB 457 Livestock Management Problems (4)

Analysis of actual livestock enterprise. Budgeting a ranch by enterprises. Analysis of internal problems such as bull purchase economics, feed buying chart, feedyard economics, cattle price relationships, livestock systems. Includes whole farm budget development and analysis. 3 lectures, 1 activity. Prerequisite: AGB 322.

AGB 458 Dairy Management Problems (4)

Analysis of actual dairy enterprise. Budgeting a dairy farm by enterprises. Analysis of problems such as load by load milk-feed analysis, value of milk quotas, most profitable concentrate to hay feeding. Includes whole farm budget development and analysis. 3 lectures, 1 activity. Prerequisite: AGB 322.

AGB 460 Research Methodology in Agribusiness (2)

Empirical application of the scientific method as it relates to the design and development of Senior Project. 2 seminars. Prerequisite: Senior standing and AGB 213.

AGB 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 150 hours total time. Prerequisite: Senior standing and AGB 460.

AGB 463 Undergraduate Seminar (2)

Individual or group presentation for discussion of subjects and problems within the agribusiness field. 2 seminars. Prerequisite: Senior standing.

AGB 510 World Agricultural Development (3)

Special problems of agriculture in less-developed countries considering the role of economic, social and institutional policies in directing development. 3 seminars. For students in M.S. in Agriculture Program/Specialization in International Agriculture Development. Prerequisite: Graduate standing or consent of instructor.

AGB 514 Agribusiness Managerial Leadership and Communication (4)

Current issues in agriculture addressed through the case analysis method. Emphasis on communication skills and leadership qualities, identifying key success requirements. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

AGB 515 International Agricultural Marketing (3)

Organization and function of international agricultural markets with emphasis on developing countries. Factors inhibiting development of an improved agricultural market structure. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

AGB 516 Agricultural Program Management in Developing Countries (3)

Overall context of decision making by program managers in developing countries. Case studies and proposal writing for effective program management. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

AGB 543 Agribusiness Policy and Program Analysis (4)

Economic, political, and social objectives of domestic agricultural policies and programs. Consequences of government's policies and programs to control production, allocate resources, support market prices, and provide benefits to food and fiber producers, marketers, and consumers. Topical analysis of current effort of government to direct agriculture. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

AGB 554 Managing Price Risk in Agribusiness (4)

Examination of alternatives available to the agribusiness manager to manage price risk. Use of forward contracts, cooperative seasonal pools, and hedging with futures contracts and options. Futures markets, their function and operation. Analysis of cash-futures price relationships, hedging guidelines, and other topics necessary for successful hedge program execution. Student involvement in a speculation and hedging simulation. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

AGB 555 Technological and Economic Change in Agribusiness (4)

Ramifications and impacts in agribusiness firms from technological and economic changes. Emphasis on specific agribusiness firms and their managerial process of dealing with problems and opportunities in the operational environments of economic, technology, political, global, domestic and marketing. 4 seminars. Prerequisite: Graduate standing, or consent of instructor.

AGB 563 International Agricultural Trade and Market Development (4)

Changing agricultural trade prospects in a dynamic world economy. Interface between strategies of government and private firms to create and expand foreign markets for U.S. agricultural products. Impacts of agricultural trade policies, agricultural market development, and the activities of agricultural export marketing firms. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

AGED-AGRICULTURAL EDUCATION**AGED 102 Personal Assessment (2) (CR/NC)**

Designed to increase the student's academic, career, and personal self-assessment as it relates to the educational process. Study skill methods, campus academic regulations, available resources and issues that face many university students. Credit/no credit grading only. 2 activities.

AGED 202 Introduction to Agricultural Education (2)

Overview of agricultural education programs including goals and purposes. Kinds of classes and types of programs. Qualifications essential to success in teaching agriculture. Planned program of studies to meet requirement for teaching. 2 lectures.

AGED 220 Agriculture Youth Conferences (2) (CR/NC)

Problems encountered and practices applied during the conduct of the annual FFA State Convention. Methods, procedures and materials adapted for use by the student in developing the committee system to produce conferences, conventions and workshops of all kinds and sizes. Total credit for AGED 220 and AGED 221 limited to 6 units. Credit/No Credit grading only. 2 activities. Prerequisite: Consent of instructor.

AGED 221 Agriculture Youth Conferences (3) (CR/NC)

Problems encountered and practices applied during the conduct of the annual FFA State Convention. Methods, procedures and materials adapted for use by the student in developing the committee system to produce conferences, conventions and workshops of all kinds and sizes. Total credit for AGED 220 and AGED 221 limited to 6 units. Credit/No Credit grading only. 3 activities. Prerequisite: Consent of instructor.

AGED 330 FFA and Supervised Agriculture Programs (6)

Implementation processes and operational procedures for initiating, conducting and integrating FFA activities and SOE Programs appropriate to community, school and student needs. Demonstration, application and observation of practices and techniques utilized by agriculture instructors in conducting organized classroom, shop, school farm, laboratory and home visit instruction in agriculture, FFA and SOE activities. 3 activities, and supervision. Prerequisite: AGED 202.

AGED 350 Undergraduate Field Experience (1) (CR/NC)

Presentations and group discussions of activities and programs unique to teaching vocational agriculture in California secondary schools. Credit/No Credit grading only. 1 lecture. Prerequisite: AGED 202 or consent of instructor. Concurrent: AGED 351.

AGED 351 Undergraduate Field Experience (1) (CR/NC)

Observation of the practices and techniques utilized by vocational agriculture teachers in conducting organized instruction in vocational agriculture classrooms, shops, school farms, laboratories. SOEP visits and FFA activities. Credit/No Credit grading only. Prerequisite: AGED 202 or consent of instructor. Concurrent: AGED 350.

AGED 404 Agricultural Leadership (2)

Emphasis is upon equipping current and prospective leaders in agriculture with the background and skills to achieve their potential. Class members will be encouraged to assess their status as leaders and to identify means whereby their effectiveness can be improved. 2 activities. Prerequisite: PSY 201 or PSY 202.

AGED 410 Computer Applications in Agricultural Education (2)

Development of computer literacy for teaching agriculture. Analysis and specialization of hardware. Instruction in video and telecommunication technology, CATI network systems and software applicable to vocational agriculture. Recommended for Agricultural Science majors and required for teaching credential candidates. Prerequisite: AG 250 or CSC 110 and consent of instructor.

AGED 424 Organizing and Teaching Agriculture (3)

Determining course objectives, content, and calendar for use by the teacher in classroom, shop and field instruction while assigned to community schools. Concurrent with student teaching. 3 activities. Prerequisite: AGED 438 and consent of instructor.

AGED 426 Presentation Methods (3)

Development and evaluation of effective means of communication by use of a variety of presentation methods including demonstration. 3 activities. Prerequisite: SPC 201.

AGED 438 Instructional Processes in Agricultural Education (3)

Preparation for student teaching in agriculture. Orientation to classroom situation. Development of plans for teaching including daily lessons and unit plans; utilization of source information and resources. Class demonstration in teaching procedures; analysis and evaluation. 1 lecture, 2 activities.

AGED 440 Student Teaching in Agricultural Education (6-12) (CR/NC)

Off-campus assignment to a selected cooperating public school. Participation in all phases of agriculture teacher duties and activities including departmental organization and administration. Prior approval and appointment necessary. Total credit limited to 18 units. Credit/No Credit grading only.

AGED 441 Student Teaching Practicum (2)

Problems encountered and practices applied during student teaching. Methods, procedures and materials adapted for use by the teacher concurrent with student teaching. 2 activities. Prerequisite: Consent of instructor.

AGED 461 Senior Project (2)

Empirical application of the scientific method as it relates to the selection of a project under faculty supervision. Projects typical of problems that graduates must solve in their field of employment. Minimum 60 hours total time.

AGED 462 Senior Project (3)

Completion of a project begun in AGED 461 under faculty supervision. Projects typical of problems that graduates must solve in their field of employment. Project results are presented in a formal report. Minimum 90 hours total time. Prerequisite: AGED 461 or consent of instructor.

AGED 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

AGED 471 Selected Advanced Laboratory (1-3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor.

AGED 513 Field Experience-Vocational Agriculture (1-3)

Practice and techniques in management and supervision of vocational agriculture programs. Relationships among students, staff, community and school groups. Budgeting, staffing, records, reporting. Student activities and Future Farmers of America programs. Total credit limited to 6 units. Prerequisite: Prior approval and appointment.

AGED 520 Program Development in Agricultural Education (3)

Development of up-to-date approaches to a total integrated program based on occupational opportunities and community needs. Philosophy, organization and administration of agricultural education programs. Development in such areas as curriculum, supervised occupational experience, Future Farmers of America, and summer programs. 3 seminars.

AGED 522 Instructional Programs in Agricultural Mechanics (3)

Organizing the vocational agriculture mechanics curriculum and determining course content. Student demonstrations and presentations; evaluation and analysis. 1 seminar, 2 laboratories.

AGED 580 Special Problems in Agricultural Education (1-3)

Individual study of modern issues and problems conducted through research, planning and development. Field problems and in-service study in agricultural industry encouraged. Final written report required. Total credit limited to 9 units with not more than 3 units in any one quarter. Prior approval of instructor required.

ANT-ANTHROPOLOGY**ANT 201 Cultural Anthropology (3) GEB D.4.a.**

The study of contemporary human cultures throughout the world. Seeks general human patterns within the diversity of individual cultures. Includes such topics as: family organization and gender roles; adaptation to the environment; systems of economic exchange; political organization and leadership; religious beliefs and values; ethnicity and cultural pluralism; impact of Western culture on the developing world. 3 lectures.

ANT 202 World Prehistory (3)

Development of the diverse human cultures of both the Old and New worlds from the earliest times until the dawn of history; cultural growth. 3 lectures.

ANT 203 Biological Anthropology (3)

Biological aspects of human unity and diversity. Primate and human evolution, including anatomical, physiological and behavioral adaptations. Origin and diversity of modern races. 3 lectures.

ANT 310 California Archaeology (3)

Diversity of California Indian cultures; field studies in locating, surveying, and analyzing aboriginal sites; excavation of a site; laboratory techniques for recording, preserving, and reporting of artifacts; relating observations and finds to the natural environment in which the site is located; integrating knowledge of natural and social sciences for the use in archaeology. 2 lectures, 1 laboratory. Prerequisite: A course in anthropology or consent of instructor.

ANT 325 Material Culture (3)

Description of processes of invention and diffusion in a multicultural world. Role of environment and primitive technology on culture. Major preindustrial inventions and their social correlates throughout the world. 3 lectures. Prerequisite: ANT 201 or consent of instructor.

ANT 333 Language and Culture (3)

A global perspective on the social and cultural factors which influence language form and language use. Topics include: language and thought; the origins and development of human language; language learning; language and cultural metaphors; language and gender; dialects; bilingualism and multilingualism; language and ethnic identity; language and political persuasion. 3 lectures. Prerequisite: Junior standing.

ANT 341 Comparative Societies (3)

Comparative study of contemporary cultures. Uses the ethnographic case study approach to investigate solutions to human problems. Examines cultural themes across at least three different cultures in different areas of the world. 3 lectures. Prerequisite: ANT 201 and junior standing.

ANT 360 Human Cultural Adaptations (3) GEB D.4.b.

Evolution of cultures and societies from an ecological perspective, emphasizing the material processes leading to both cultural diversity and similarity. 3 lectures. Prerequisite: Any course in GEB area D.4.a.

ANT 401 Culture and Health (3)

Global perspective on the relationship between culture and health. Ecological factors influencing health and illness. Impact of Western culture on world health. Health systems throughout the world. Theories of disease causation. Methods of diagnosis. Treatment modes. Health-care needs of U.S. ethnic groups. 3 lectures. Prerequisite: Junior standing.

ANT 420 Development Anthropology (3)

Application of the basic concepts of anthropology to problems of development. Major theories of change and development. Sociocultural dimensions of economic development. Context of development in the Third World. Roles that anthropologists and other social scientists play in the development process. 3 lectures. Prerequisite: ANT 201 or consent of instructor.

ANT 444 Sex, Death and Human Nature (3)

How Darwinian processes of differential reproduction and mortality influence human interests, passions, and behaviors. Theories of inclusive fitness, parental investment and senescence. Sex differences, sexual attraction, life histories, violence and aggression, including rape, homicide and

infanticide. 3 lectures. Prerequisite: One upper division ANT course or consent of instructor.

ANT 450 Area Studies (3)

Comparative analysis of cultural diversity and uniformity within a selected region (e.g., Latin America, Subsaharan Africa). *Class Schedule* will list topic selected. Total credit limited to 12 units. 3 lectures. Prerequisite: ANT 201 or consent of instructor.

ANT 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topics selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ARCE–ARCHITECTURAL ENGINEERING**ARCE 221 Elementary Structures (3)**

Forces on building structures. Static equilibrium and stability of structural systems. Shear and bending moment diagrams. 3 lectures. Prerequisite: PHYS 131, MATH 142.

ARCE 222 Mechanics of Structural Members I (3)

Stress-strain relationships. Stresses and deformations in structural members due to axial force, shear, torsion, and moment. 3 lectures. Prerequisite: ARCE 221.

ARCE 223 Mechanics of Structural Members II (3)

Advanced topics of stresses in beams. Plastic bending, unsymmetrical bending. Combined stresses. Stress transformation. Buckling. Deflection of beams. Analysis of indeterminate structures. 3 lectures. Prerequisite: ARCE 222. Co-requisite: ARCE 224.

ARCE 224 Mechanics of Structural Members Laboratory (1)

Testing and analysis of structural members. Experiments pertaining to concepts examined in ARCE 222 and ARCE 223. 1 laboratory. Prerequisite: ARCE 222. Co-requisite: ARCE 223.

ARCE 226 Structural Systems for Architects (3)

Concepts of structural integrity and stability, structural subsystems, methods of analysis. 3 lectures. Prerequisite: ARCE 222.

ARCE 227 Structural Analysis I (2)

Continuation of ARCE 221. Advanced topics in two-dimensional equilibrium and three-dimensional equilibrium of structural building systems. 2 lectures. Prerequisite: ARCE 221.

ARCE 240 Additional Engineering Laboratory (1–2)

Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 or 2 laboratories.

ARCE 302 Structural Analysis II (3)

Analysis of statically indeterminate structures. Energy methods. Slope-deflection. Moment distribution including sidesway. 3 lectures. Prerequisite: ARCE 223 and ARCE 227.

ARCE 303 Steel Design I (3)

Analysis and design of steel structural members subjected to bending, shear and axial forces. 3 lectures. Co-requisite: ARCE 302.

ARCE 304 Timber Design (3)

Analysis and design of timber structural members subjected to bending, shear, and axial forces. Wood diaphragms, shear walls and their connections. 3 lectures. Prerequisite: ARCE 223 and ARCE 227.

ARCE 305 Masonry Design (2)

Design of load-bearing walls, shear walls, columns and beams in masonry. 2 lectures. Prerequisite: ARCE 223 and ARCE 227.

ARCE 306 Matrix Analysis of Structures (3)

Analysis of statically indeterminate structures by direct stiffness method including continuous beams, plane trusses, and introduction to three-dimensional structures. 3 lectures. Prerequisite: ARCE 302.

ARCE 309 Survey of Soil Mechanics and Foundation Engineering (3)

Fundamentals of foundation engineering, evaluation of soil reports, principles of determination of bearing capacity, soil classification, selection of types of foundations, evaluation of expansive properties of foundation soils, discussion of basic laboratory tests. 3 lectures. Prerequisite: ARCE 226.

ARCE 311 Structures for Landscape Architects (3)

Structural concepts related to landscape architecture. Design of retaining walls, decks, trellises, bridges and large-scale covered spaces. 3 lectures.

ARCE 321 Timber Design (3)

Design of timber structures. Limitations and potential of the material in relation to the design and construction process. For architecture and construction students. 3 lectures. Prerequisite: ARCE 226.

ARCE 322 Steel Design (3)

Design of steel structures. Limitations and potential of the material to the design and construction process. For architecture and construction students. 3 lectures. Prerequisite: ARCE 226.

ARCE 323 Concrete and Masonry Design (3)

Design of reinforced concrete and masonry structures. Limitations and potential of the material to the design and construction process. For architecture and construction students. 3 lectures. Prerequisite: ARCE 226.

ARCE 325 Dynamics (4)

Static and dynamic loads, rigid body dynamics. Vibrations of spring-mass systems. Degrees of freedom and vibration modes. 4 lectures. Prerequisite: ARCE 223 and MATH 242.

ARCE 351 Structural Computing Analysis I (1)

Computer calculations, programming and technical reporting. Emphasis on use of spreadsheets to generate structural analyses of buildings: the structural system and its individual elements. Miscellaneous course fee may be required—see *Class Schedule*. 1 laboratory. Prerequisite: ARCE 222.

ARCE 352 Structural Computing Analysis II (1)

Computer calculations, programming and technical reporting. Emphasis on use of two-dimensional structural analysis software to analyze a building's structural system and its individual elements. Miscellaneous course fee may be required—see *Class Schedule*. 1 laboratory. Prerequisite: ARCE 222.

ARCE 353 Structural Computing Analysis III (1)

Emphasis on the use of nonplanar structural analysis software to analyze a building's structural system and its individual elements. Miscellaneous course fee may be required—see *Class Schedule*. 1 laboratory. Prerequisite: ARCE 302.

ARCE 371 Structural Systems Laboratory (3)

Studies in the relationship of structural framing to overall building geometry with emphasis on the static stability of structural configurations. 3 laboratories. Prerequisite: ARCE 231. Co-requisite: ARCE 302.

ARCE 372 Steel Structures Design Laboratory (3)

Design project utilizing structural steel. 3 laboratories. Prerequisite: ARCH 231, ARCE 302, ARCE 303, ARCE 352 and ARCE 371.

ARCE 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

ARCE 403 Advanced Steel Structures Laboratory (3)

Advanced topics in design of steel structures with emphasis on plate girders, plastic design of continuous beams and frames and composite steel-concrete design. 3 laboratories. Prerequisite: ARCE 303, ARCE 372, or equivalent.

ARCE 412 Dynamics of Framed Structures (3)

Analysis of structures subjected to dynamic loads with single- and multi-degrees of freedom. Development of techniques for analysis of structures in response to seismic, wind, and moving loads. Solution of problems by digital computer. 3 lectures. Prerequisite: ARCE 483.

ARCE 414 Precast Concrete (3)

Precast and prestressed concrete principles, materials and techniques of construction. Concrete mixes, forming, casting, finishing, curing and erection methods of precast concrete. Design potentials, aesthetics, cost and construction time as related to buildings and other structures. 3 lectures. Prerequisite: ARCE 323 or ARCE 444 or equivalent.

ARCE 421 Soil Mechanics (3)

Principles of soil mechanics, including rudiments of geology, soil classification, gravimetric and volumetric relations, compaction, methods and testing, shear strength of soil and strength theories. 2 lectures, 1 laboratory. Prerequisite: ARCE 222, GEOL 201 or consent of instructor.

ARCE 422 Foundation Design (3)

Soil-bearing capacity and settlement characteristics of soils. Sizing and design of spread footings. Design and analysis of earth-retaining structures. 3 lectures. Prerequisite: ARCE 421.

ARCE 423 Advanced Foundation Design (3)

Design and analysis of beams on elastic foundations and mat foundations. Pile foundations and sheet pile retaining structures. 3 lectures. Prerequisite: ARCE 422.

ARCE 444 Reinforced Concrete Laboratory (3)

Theory and design of basic reinforced concrete elements: columns, beams, tee beams and one way slabs. 3 laboratories. Prerequisite: ARCE 371 and ARCE 372.

ARCE 445 Prestressed Concrete Design Laboratory (3)

Design and analysis of prestressed concrete structures. 3 laboratories. Prerequisite: ARCE 444.

ARCE 446 Advanced Structural Systems Laboratory (3)

Concepts and issues involved in the design of complex structures including tall buildings, shells, arches and tension structures. 3 laboratories. Prerequisite: ARCE 226 or ARCE 371 or consent of instructor.

ARCE 447 Advanced Reinforced Concrete Laboratory (3)

Advanced topics in the design of reinforced concrete structures with emphasis on isolated and combined foundations, retaining walls, seismic-resistant ductile frames and plastic design method for slabs, plates, beams and shells. 3 laboratories. Prerequisite: ARCE 444 or equivalent.

ARCE 451 Timber and Masonry Structures Design Laboratory (3)

Design projects utilizing timber and masonry. Relationship of structural detailing to overall structural behavior. Production of structural calculations and drawings. 3 laboratories. Prerequisite: ARCE 304, ARCE 305, ARCE 372 or consent of instructor.

ARCE 452 Concrete Structures Design Laboratory (3)

Design projects utilizing reinforced concrete. Layout of the structure and preliminary design. Production of design calculations and structural drawings. Two-way slab design. 3 laboratories. Prerequisite: ARCE 444 or consent of instructor.

ARCE 453 Senior Project Laboratory (3)

Projects by individuals or teams which involve, but are not limited to, physical modeling and testing of integrated design projects which may include students from other disciplines. 3 laboratories. Prerequisite: ARCE 451 or ARCE 452, ARCE 483.

ARCE 457 Structural CAD for Building Design (2)

Emphasis on the use of computer graphics software to represent a building's structural system and its individual elements. Miscellaneous course fee may be required—see *Class Schedule*. 1 lecture, 1 laboratory. Prerequisite: ARCH 113 and CSC 250.

ARCE 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 lectures. Prerequisite: Consent of instructor.

ARCE 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit

limited to 6 units. 1–3 laboratories. Prerequisite: Consent of instructor.

ARCE 480 Senior Seminar (1)

Discussion of selected topics that are of current interest to the structural engineering profession. 1 seminar. Prerequisite: Senior standing.

ARCE 481 Structural Experimental Laboratory (1)

Application of techniques of physical modeling to obtain solutions to structural design problems. Miscellaneous course fee may be required—see *Class Schedule*. 1 laboratory. Prerequisite: ARCE 444.

ARCE 483 Seismic Analysis and Design (4)

Introduction to dynamic response analysis of building structures with emphasis on earthquake ground motion. Earthquake resistant design of buildings in accordance with building codes. Application of computer programs and physical models for seismic design. Laboratory studies utilizing physical models for studying the behavior of building structures subjected to simulated ground motions. 3 lectures, 1 activity. Prerequisite: ARCE 325, ARCE 372, CSC 331.

ARCE 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

ARCE 490 History of Structures (3)

Tracing developments in structural materials, structural understanding and complete structures from ancient times through the industrial revolution and the present day. 3 lectures. Prerequisite: Junior standing.

ARCE 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

ARCE 504 Finite Element Method for Building Structures (3)

Basic concepts of equilibrium and compatibility. Stiffness and flexibility properties of various types of finite elements. Development and application of displacement and force methods. Elastic stability and dynamic response of buildings to earthquake, wind, and moving loads. Use of finite-element computer programs. 3 lectures. Prerequisite: MATH 242, ARCE 306, or consent of instructor.

ARCE 521 Architectural Structures (3)

Static and dynamic loads, structural equilibrium and stability, structural configurations and systems, response to dynamic

loads, behavior of structures. 2 seminars, 1 activity.
Prerequisite: Graduate standing in Architecture.

ARCE 522 Structural Systems (3)

Exploration of the relationship between structural systems and architectural form. Understanding of structural stability and structural order is developed through construction of a series of small scale models. Historical perspectives are presented along with the effects of available materials and technology on structural possibilities. 3 seminars.

Prerequisite: Graduate standing in Architecture.

ARCE 523 Seismic Design for Architects (3)

Introduction to the earthquake resistant design of buildings. Observed behavior of buildings during earthquakes. Recent developments of seismic design procedures, provisions, and building codes. Influence of architectural form on seismic response. 3 lectures. Prerequisite: Graduate standing in Architecture.

ARCH-ARCHITECTURE

ARCH 101 Survey of Architectural Education and Practice (2) (CR/NC)

Exploration of the major paradigms which have guided the development of architectural education and the profession. Survey of the roles of the architects and an introduction to curricula and programs designed to prepare students for careers in architecture. 2 lectures. Credit/No Credit grading only.

ARCH 106 Materials of Construction (3)

Use and application of construction processes and materials. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory.

ARCH 111 Introduction to Drawing and Perspective (3)

Basic techniques used in graphic communication. Orthographic and isometric projection. Mechanical perspective, shades and shadows. 3 laboratories.

ARCH 112 Basic Graphics (3)

Drawing as a communication tool in the environmental design fields. Exercises to develop basic skills and speed in the representation of ideas. Use of various drawing media. 3 laboratories. Prerequisite: ARCH 111, or consent of instructor.

ARCH 113 Graphic Analysis and Communication Skills (3)

Further development of freehand graphic communication skills for representation of conceptual ideas analysis, and design concepts. Demonstrates the link between graphics, design process and communications. 3 laboratories. Prerequisite: ARCH 111, ARCH 112.

ARCH 202 Creative Problem-Solving (3)

Techniques for stimulating creative behavior applied to general and environmental problems. Development of problem-solving and decision-making skills and knowledge. 3 lectures.

ARCH 204 Architectural Theory (3)

Theories of architectural design. 3 lectures. Prerequisite: EDES 101.

ARCH 207 Environmental Control Systems I (4)

Theory and application of climate, energy use and comfort as determinants of architectural form. Emphasis on architectural methods of ventilating, cooling, heating, and lighting for envelope-load dominated buildings. 2 lectures, 2 laboratories. Miscellaneous course fee required—see *Class Schedule*. Prerequisite: PHYS 131, PHYS 132, ARCH 250.

ARCH 221, 222 Architectural Design Fundamentals (3) (3)

Development of knowledge and abilities in the theories, processes, and methods of creative problem solving; basic visual and verbal communication; basic two and three-dimensional design and composition and the analysis of the built environment. 3 laboratories. Prerequisite: EDES 101, ARCH 111, ARCH 113.

ARCH 231 Architectural Practice (3)

Wood construction methods and processes. Construction documents used as communication medium for such methods and processes. 3 laboratories. Prerequisite: ARCH 106 and ARCH 111. Prerequisite or concurrent enrollment in ARCH 250.

ARCH 240 Additional Architectural Laboratory (1–2)

Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 or 2 laboratories.

ARCH 250 Computer Applications (3)

GEB F.1.

Introduction to the application of computers in architecture. History of computing and its use in architectural practice, hardware options, operating systems, electronic mail, databases, programming languages, graphics systems, survey and use of selected applications in architecture. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory.

ARCH 251 Architectural Design Fundamentals I (5)

Theories, principles, methods and means pertaining to the creation of two- and three-dimensional visual organizations to communicate intended concepts and meanings. 5 laboratories. Prerequisite: ARCH 111, ARCH 112, ARCH 113, EDES 101.

ARCH 252 Architectural Design Fundamentals II (5)

Continuation of the content and issues introduced in ARCH 251 plus the theories, principles, methods and means pertaining to the creation of architectural form, space and organizations and the incorporation of function and light as issues that shape the built environment and support the communication of intended concepts and meanings. 5 laboratories. Prerequisite: ARCH 251.

ARCH 253 Architectural Design Fundamentals III (5)

Continuation of the content and issues introduced in ARCH 251 and ARCH 252 plus the theories, principles, methods and means pertaining to the incorporation of context, structure and climate as issues that shape the built environment and support the communication of intended concepts and meanings. 5 laboratories. Prerequisite: ARCH 251, ARCH 252, ARCH 106.

ARCH 270 Selected Topics (1–3)

Directed group study of selected topics. *Class Schedule* will list topic selected. Open to first-, second-, third-year students. Total credit limited to 6 units. 1 to 3 lectures.

ARCH 302 Principles of Architectural Design (3)

Basic theory of the art of architecture and its application in architectural design. 3 lectures. Prerequisite: ARCH 204.

ARCH 303 Human Factors for Environmental Designers (3)

Integrated approach to development of systematic design programs. Developing and interpreting human factors design criteria, performance and satisfaction as a function of environmental factors, determining and assessing user preferences, methods of field observation and analysis. 3 lectures. Prerequisite: Second-year standing in College of Architecture and Environmental Design or consent of instructor.

ARCH 307 Environmental Control Systems II (4)

Theory and application in the integration of environmental control systems and architectural form. Comprehensive techniques for achieving an architecture of the well-tempered environment. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: ARCH 207, ARCH 250. Concurrent enrollment required in ARCH 352.

ARCH 310 Architectural Design Methods and Theories (4)

Analysis of design process, methods of analysis, synthesis, and evaluation in design. Relation between methods used and theories of design. 4 lectures. Prerequisite: ARCH 253.

ARCH 312 Home and Community Design (3) GEB F.2.

Historical development of the home and city and the effect of location, climate, social and technological factors on homes and cities. Considerations and design methodology; furniture, landscape, and relation of home to community environment. For non-Architecture majors. 3 lectures. Prerequisite: Junior standing.

ARCH 313 Advanced Delineation (2)

Development of proficiency in architectural presentation. Projects and critiques. 2 laboratories. Prerequisite: ARCH 253.

ARCH 316 California Architecture and the California Dream (3) GEB C.3.

Development of California Architecture as the symbolic expression of the myth of the California Dream. Focus on tracing California's unique contribution to architecture and urban patterns in the United States. 3 lectures. Prerequisite: ENGL 114.

ARCH 317 History of Architecture (3) GEB C.3.

Architecture and urbanism in the Mediterranean Basin, Europe and Asia from prehistory to about AD 900. Cultural and physical conditions which influenced the built environment. 3 lectures. Prerequisite: ENGL 114.

ARCH 318 History of Architecture (3) GEB C.3.

Architecture and urbanism in the Pre-Columbian Americas, and the developments in the West from the Middle Ages until the end of the Baroque. Cultural and physical conditions

which influenced the built environment. 3 lectures.

Prerequisite: ENGL 114.

ARCH 319 History of Architecture (3) GEB C.3.

Architecture and urbanism from Neo-Classicism to the present. Cultural and physical conditions which influenced the built environment. 3 lectures. Prerequisite: ENGL 114.

ARCH 337 Photographic Presentation (2)

Media presentations in architecture with emphasis on black and white and color print photographic presentations, formats, and techniques applicable to architecture subjects and to design communication. 1 lecture, 1 laboratory. Prerequisite: ARCH 111, ARCH 112, ARCH 113.

ARCH 338 Media Presentations in Architecture (2) (CR/NC)

Media presentations in architecture with emphasis on photographic color slide presentations, formats and techniques applicable to architectural subjects and to design communication. For students in CAED. Credit/No Credit grading only. 1 lecture, 1 laboratory. Prerequisite: ARCH 111, ARCH 112, ARCH 113.

ARCH 339 Video Presentations in Architecture (2) (CR/NC)

Media presentations in architecture with emphasis on video format and creative camera and editing techniques as applicable to subjects in architecture and design communication. Open to students in CAED. Credit/No Credit grading only. 1 lecture, 1 laboratory. Prerequisite: ARCH 111, ARCH 112, ARCH 113.

ARCH 341, 342 Architectural Practice (4) (4)

Construction systems in masonry, steel, and concrete and combinations of these materials. Preparation of outline specifications. Production of design development drawings. 2 lectures, 2 laboratories. Prerequisite: ARCH 231, ARCH 253. Concurrent enrollment required in ARCH 341: ARCH 351; ARCH 342: ARCH 353.

ARCH 350 Computer Applications in Architecture (3)

Applications of computer systems to large-scale data processing, analysis, optimization and evaluation of design program elements. 2 lectures, 1 activity. Prerequisite: ARCH 250.

ARCH 351 Architectural Design (5)

Continuation of ARCH 253. Development and exploration of architectural theories, building systems, and design processes involved in creating appropriate architecture on a sensitive site; implications of the site as building form generator. Miscellaneous course fee required—see *Class Schedule*. 5 laboratories. Prerequisite: ARCE 226, ARCH 231, ARCH 253. Concurrent enrollment required in ARCH 341.

ARCH 352 Architectural Design (5)

Continuation of ARCH 351. Development and exploration of architectural theories, building systems, and design processes involved in creating appropriate sustainable architecture with an emphasis on ecological and environmental concerns. Miscellaneous course fee required—see *Class Schedule*. 5 laboratories. Prerequisite: ARCE 226, ARCH 231, ARCH 253. Concurrent enrollment required in ARCH 307.

ARCH 353 Architectural Design (5)

Continuation of ARCH 352. Development and exploration of architectural theories, building systems, and design processes involved in creating appropriate architecture with an emphasis on socio-cultural and space planning/life safety concerns. Miscellaneous course fee required—see *Class Schedule*. 5 laboratories. Prerequisite: ARCE 226, ARCH 231, ARCH 253. Concurrent enrollment required in ARCH 342.

ARCH 357 Computer Graphics in Architecture (4)

Computer-aided drawing methods in architectural practice, focusing on two-dimensional and three-dimensional graphics on micro-computers. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: ARCH 250.

ARCH 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ARCH 401 Toward a Barrier-Free Environment (3)

Exploring the interface between the built environment and human behavior. Physical and psychological design determinants. Attitudes towards deviancy, accessible environments and persons with disabilities. Legal, ethical, human factors. 3 lectures. Prerequisite: Junior standing or consent of instructor.

ARCH 407 Environmental Control Systems III (4)

Theory and application of mechanical and electrical systems for comfort. Emphasis on internal-load dominated buildings. Consideration of artificial lighting, H.V.A.C. systems, acoustics, water and waste systems. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: ARCH 307. Concurrent enrollment required in ARCH 451.

ARCH 411 Climatic Determinants of Building Design (2)

Influence of solar radiation and climatic conditions on siting and design of buildings. Architectural principles and energy conservation. 2 lectures. Prerequisite: PHYS 132, ARCH 307.

ARCH 413 The Built Environment: Issues and Education (3)

Identification of major issues in the design and creation of the built environment. Strategies for developing instructional units related to critical thinking and problem solving in the K-12 school setting. 1 lecture, 2 activities. Prerequisite: Junior standing.

ARCH 420 Seminar in Architectural History (3)

Architectural history, theory and criticism. Specific areas, periods, approaches and the relevance of history on present and future design issues. *Class Schedule* will list topic selected. 3 seminars. Prerequisite: 4th year or senior standing and ARCH 317, ARCH 318, and ARCH 319.

ARCH 441 Professional Practice (3)

The practice of architecture as it relates to the profession, firm organization and management. An introduction to the process and requirements from graduation to licensed

professional. 1 lecture, 2 activities. Prerequisite: ARCH 407 and ARCH 451. Concurrent enrollment required in ARCH 452.

ARCH 442 Professional Practice (3)

Continuation of ARCH 441. The practice of architecture as it relates to the architect's role and responsibilities for building project development, delivery, and construction administration. Introduction to the architect's legal and ethical relationship to owner, contractor and subcontractors before, during and following the building construction process. 1 lecture, 2 activities. Prerequisite: ARCH 441 and ARCH 452. Concurrent enrollment required in ARCH 453.

ARCH 445 Urban Design in Architecture (3)

Design role of the urban architect. Economic, environmental and technological forces impacting on architectural practice in urban areas. 3 lectures. Prerequisite: ENGL 114.

ARCH 446 The Small Scale Master Builder (4)

Principles of practice as owner-designer-builder, selling or leasing products. Comparison with traditional practice. Potential income, constraints on design decisions, and ethics. Analysis of factors and methods relevant to such practice, including financing, taxes, accounting, market analysis, and development potential. Starting with little or no capital. 4 lectures. Prerequisite: Fourth-year standing.

ARCH 447 Design Regulations (3) (Also listed as CRP 447)

Practical application of fundamental building code requirements and zoning regulations in the design process. Codes and regulations used including city zoning regulations, city parking and driveway standards, the Uniform Building Code, and architectural barrier laws. 3 lectures. Prerequisite: ARCH 342.

ARCH 451 Architectural Design (5)

Continuation of ARCH 351, 352, 353. Problems of increasing architectural complexity involving the comprehensive integration of architectural theory, design processes, and building systems with emphasis placed on multifunction singular buildings. Miscellaneous course fee required—see *Class Schedule*. 5 laboratories. Prerequisite: ARCH 307, ARCH 341, ARCH 342, ARCH 351, ARCH 352, ARCH 353, ARCE 321, ARCE 322, ARCE 323. Concurrent enrollment required in ARCH 407.

ARCH 452 Architectural Design (5)

Continuation of ARCH 451. Problems of increasing architectural complexity involving the comprehensive integration of architectural theory, design processes, and building systems with emphasis placed on multibuilding, multifunctional projects. Miscellaneous course fee required—see *Class Schedule*. 5 laboratories. Prerequisite: ARCH 407 and ARCH 451. Concurrent enrollment required in ARCH 441.

ARCH 453 Architectural Design (5)

Continuation of ARCH 452. Problems of increasing architectural complexity involving the comprehensive integration of architectural theory, design processes, and building systems with emphasis placed on multifunctional projects in an urban context. Miscellaneous course fee

required—see *Class Schedule*. 5 laboratories. Prerequisite: ARCH 441 and ARCH 452. Concurrent enrollment required in ARCH 442.

ARCH 455 Human Factors Applications in Architecture (3)

Human factors applications: human factors taxonomy, standardized information system, ergonomic research methods, evaluation procedures, and application strategies. 3 lectures. Prerequisite: ARCH 303 or consent of instructor.

ARCH 460 Advanced Computer Graphics in Architecture (3)

Advanced methods in the application of computer graphics and multi-media techniques in architectural design. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 activity. Prerequisite: ARCH 250 or equivalent and consent of instructor.

ARCH 461 Advanced Computer-Aided Design in Architecture (3)

Advanced applications of computers in architectural design with emphasis on utilizing intelligent tools in the design process. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 activity. Prerequisite: ARCH 357 or equivalent and consent of instructor.

ARCH 463 Undergraduate Seminar (2) (CR/NC)

Discussion and lectures on problems of practice in architecture. Professional ethics. Students present organized material on some subject of interest in architecture. 2 seminars. Prerequisite: Fourth-year standing in architecture. Credit/No Credit grading only.

ARCH 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ARCH 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 laboratories. Prerequisite: Consent of instructor.

ARCH 480 Special Studies in Architecture (1–12)

Special issues and problems through research, field trips, design projects, and other forms of investigation and involvement. Course requirements are determined prior to each individual project through a contractual agreement between students and department. The departmental Off Campus Study Guidelines apply except when superseded by guidelines and practices of the London Study Program of the School of Liberal Arts. Total credit limited to 36 units. Prerequisite: Junior standing.

ARCH 481 Senior Architectural Design Thesis Project (5)

Comprehensive building design and research project in an architectural concentration area. Demonstration of professional competency in integration of architectural theory, principles and practice with creative, organizational and technical abilities in architectural programming, design

and design research. Total credit limited to 15 units, with a maximum of 5 units per quarter. Miscellaneous course fee required—see *Class Schedule*. 5 laboratories. Prerequisite: ARCH 407, ARCH 441, ARCH 442, ARCH 451, ARCH 452, ARCH 453 and fifth year standing.

ARCH 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

ARCH 491 Design Project (2)

Comprehensive architectural design project chosen by the student to challenge technical, creative, and organizational abilities. Project to involve community or field contact. Projects involving other disciplines encouraged. 2 laboratories. Prerequisite: ARCH 407, ARCH 441, ARCH 442, ARCH 451, ARCH 452, ARCH 453 and fifth year standing. Concurrent enrollment required in ARCH 481.

ARCH 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

ARCH 501 Environmental Control Systems (3)

Comparative analysis and evaluation of mechanical and electrical building systems in high-rise and special purpose low-rise buildings. 3 seminars. Prerequisite: ARCH 407.

ARCH 510, 511 Environmental Design Methods (3) (3)

Application of systematic, step-by-step procedures to rational and intuitive judgmental tasks. Methods for formulation, idea production, evaluation, and testing applied to planning, testing, design information systems, communication between designer and client, user participation in design, and other current topics. 511 focuses on specific problem area among topics and may be repeated up to 9 units. 3 lectures. Prerequisite: Graduate standing.

ARCH 513 Natural Architectural Lighting (3)

Perception and awareness of light; natural light as generator of urban spaces and building forms. Principles of design in lighting fundamentals and techniques. 3 lectures. Prerequisite: ARCH 407 or consent of instructor.

ARCH 519 Theory of Architecture (3)

Comparative analysis of the major historic influences which have contributed to the development of architectural design theories. *Class Schedule* will list topic selected. Total credit limited to 9 units. 1 lecture, 2 seminars. Prerequisite: ARCH 319 or graduate standing.

ARCH 531 Habitability (3)

Habitability standards and concepts significant for architectural design and practice. Behavioral analysis of habitats, facilities and urban systems. Design and development of structures and systems responsive to human needs. Habitability and environmental specifications, human factors, human engineering, behavioral sciences. 3 seminars. Prerequisite: ARCH 303, ARCH 453, or consent of instructor.

ARCH 532 Quantitative Methods in Architecture (3)

Roles of research in environmental design analysis. Approaches to research, hypothesis testing, data banks, and information systems for design. Use of research findings in various decision-making systems. 3 seminars. Prerequisite: Graduate standing.

ARCH 533 Architectural Programming (3)

Information management in the design process. Techniques for gathering, analyzing, and transforming data for use as design information. Variety of approaches to pre-design planning. 3 seminars. Prerequisite: ARCH 453.

ARCH 537 Principles of Development (3)

Theory and application of the architect's role in real estate development. Topics include financing, corporate structuring, feasibilities, market studies, and proposal presentation. Emphasis on the influence of design on the success of the development process. 3 seminars. Prerequisite: Graduate standing in Architecture, or consent of instructor.

ARCH 551 Architectural Design (5)

Professional initiative and responsibility in integrating architectural design theory and practice with fields influencing the total environment. Building types considered as the coordinating factor. Total credit limited to 15 units with no more than 5 units in any one quarter. 5 laboratories. Prerequisite: Graduate standing.

ARCH 561 Advanced Design (3)

Continuation of ARCH 551. Advanced studies integrating architectural design theory and practice with fields influencing the shaping of the total environment. Total credit limited to 9 units. 3 laboratories. Prerequisite: Graduate standing.

ARCH 563 Professional Seminar (2)

Problems and topics in the field of the architectural profession. Seminar drawn upon expertise of visiting professionals in addition to topics presented by regular faculty and students. 2 seminars. Prerequisite: Graduate standing.

ARCH 580 Seminar in Theory of Architecture (3)

Directed group study of selected topics in the theory of architecture for graduate students. *Class Schedule* will list specific topics selected. Total credit limited to 9 units. 3 seminars. Prerequisite: ARCH 453.

ARCH 598 Master's Design Project (3-6)

Completion of a master project demonstrating in-depth research ability at a graduate level. Total credit limited to 9 units. 3 or 6 laboratories. Prerequisite: Consent of graduate adviser.

ARCH 599 Master's Thesis (3-6)

Completion of a thesis embodying original research in an area of environmental design. Total credit limited to 9 units. Prerequisite: Consent of graduate adviser.

ART**ART 101 Fundamentals of Drawing (4) GEB C.2.**

Analysis, history and practice of the art of drawing. Drawing problems progress from simple geometric shapes to more sophisticated subject matter, expanding visual awareness. Lectures on historical methods and the importance of drawing. Development of individual techniques. 1 lecture, 3 activities.

ART 104 Introduction to Art Materials (3)

Manipulation and experimentation with a wide variety of art media and techniques. Evaluation of expressive and design qualities in group and individual projects. 3 activities.

ART 108 Fundamentals of Sculpture (4) GEB C.2.

Studio course in the creative investigation of three-dimensional form through problems in modeling, casting, carving and assembly. Emphasis on expression, aesthetics and history. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 3 activities.

ART 111 Introduction to Art (4) GEB C.2.

Designed to acquaint the non-art major with painting, sculpture, drawing, crafts, architecture, and printmaking. Development of vocabulary, analytic skills, and research techniques for the understanding of art objects. 4 lectures.

ART 112 Survey of Western Art (3) GEB C.2.

History of major art movements in western civilization from Greek art to the present. Representative periods of western culture, such as the Classic tradition, the Middle Ages, the Italian Renaissance, the Renaissance in Northern Europe, Baroque and Rococo, Romanticism, Neo-Classicism and Modernism. 3 lectures.

ART 131 2-Dimensional Design Fundamentals (3)

Basic design theory in black, white and greys covering the visual elements and principles in two dimensions. 1 lecture, 2 activities.

ART 132 Beginning Color Theory (3)

Basic design color theory developed through exercises in hue, value and intensity. 1 lecture, 2 activities. Prerequisite: ART 131.

ART 133 Color and Design (3)

Advanced color problems in two-dimensional design theory covering compositional, optical and psychological aspects of visual communication. 1 lecture, 2 activities. Prerequisite: ART 131, ART 132.

ART 134 3-Dimensional Design (3)

Studio course in research and application of principles, elements and criticism of three-dimensional design concepts. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories.

ART 135 Introduction to Product Design (3)

Studio course using 3-dimensional forms and materials. Introduction of product design including concept, illustration and assembly methods. Miscellaneous course fee required—see *Class Schedule*. 3 activities. Prerequisite: ART 134, or consent of instructor.

ART 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

ART 201 Intermediate Drawing (3)

Development of additional drawing techniques with emphasis on form and composition. 3 activities. Prerequisite: ART 101.

ART 204 Beginning Watercolor (3)

Transparent watercolor painting. Course emphases: proper use of watercolor paper, brush techniques, pigment mixing, use of color, use of washes, wet-into-wet, indirect methods, composition and presentation. 3 activities. Prerequisite: ART 101.

ART 211 Art History—Prehistoric through the European Middle Ages (4)

Nature and development of outstanding works of art from ancient cultures in Europe, Egypt and the Eastern Mediterranean. Emphasis upon the study of painting, sculpture and related visual arts that coincide with historical background factors. 4 lectures.

ART 212 Art History—European Renaissance through Baroque Eras (4)

Studies concentrate upon significant visual expressions of the Renaissance and Baroque eras in painting, sculpture and architecture. Relevancy of historical background factors to art expression emphasized. 4 lectures. Prerequisite: ART 211.

ART 213 Art History—European 18th and 19th Century Art (4)

Painting, sculpture and the related visual arts culminating with Romanticism, Neoclassicism, and Realism. Historical factors and artistic leaders pertinent to art expression of these eras emphasized. 4 lectures. Prerequisite: ART 211 or ART 212.

ART 221 Basic B/W Photography (3)

Fundamental techniques in black and white photography. Mechanics of cameras and equipment, optics, composition, filters, subject content, developing, printing, and mounting. Understanding photographic principles, producing a quality continuous tone print, and print presentation. 35mm camera with manual adjustment capability required. 2 lectures, 1 laboratory.

ART 222 35mm Intermediate B/W Photography (3)

Control of tonal range using 35mm cameras and available daylight illumination. Composition and visual communication. Assignments range from close-ups to architecture. Emphasis on "photographic seeing" and professional quality enlargements. 2 lectures, 1 laboratory. Prerequisite: ART 221.

ART 224 35mm Advanced B/W Photography (3)

Advanced B/W photography using 35mm cameras. Artificial light including studio electronic flash, tungsten studio light, and hand strobe. Professional quality developing and printing. Includes portraiture, close-ups, product, and action. 2 lectures, 1 laboratory. Prerequisite: ART 221, ART 222.

ART 231 Computer Imaging and Design (3)

Introduction to the Macintosh system to acquaint students with operating procedures. Students will learn QuarkXPress, Adobe Illustrator, Aldus Freehand, and Adobe Photoshop for use in their own creative design or photography. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: ART 133 and CSC 113 or consent of the instructor.

ART 232 Beginning Graphic Design (3)

Basic terminology, studio skills, assembly methods, photographic reproduction processes, and specification for graphic designers. Familiarization with the various services available. 2 lectures, 1 laboratory. Prerequisite: ART 131, ART 132, ART 133.

ART 242 Glassblowing (4)

Studio course in the offhand process of working with glass from a furnace. Overview of glass history. Development of tools and forming processes studied while students develop 3-dimensional projects. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 activities.

ART 245 Ceramics I (3)

Studio course in basic clay working with emphasis on design quality, hand building, and use of the potter's wheel. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories.

ART 255 Jewelry Design (3)

Studio course in nonferrous metal techniques including cutting, forming, soldering, and forging with emphasis on creative design solutions. Miscellaneous course fee required—see *Class Schedule*. 3 activities.

ART 301 Advanced Drawing (3)

Development of advanced methods and techniques in the study of form and structure. Emphasis on problem solving. 3 activities. Prerequisite: ART 131 and ART 201.

ART 302 Life Drawing I (3)

Development of methods and techniques in the study of form and structure as it relates to human proportion and anatomy analysis. 3 activities. Prerequisite: ART 201.

ART 303 Life Drawing II (3)

Advanced problems in life drawing. Advanced methods and techniques in the study of the human form as it relates to proportion, anatomy analysis and composition. 3 activities. Prerequisite: ART 302.

ART 304 Advanced Watercolor (3)

Transparent watercolor painting. Design and composition of painting, use of drawing and advanced watercolor techniques. 3 activities. Prerequisite: ART 204.

ART 305 Painting Techniques (3)

Physical characteristics of painting media, creative understanding of pictorial space and color. 3 activities. Prerequisite: ART 101.

ART 306 Figure Painting (3)

Comparative development of proportion and structure of the human head and figure as it relates to color and value. Mixing of pigment color and its implementation to figure painting. Continued emphasis with figure, its artistic placement in space and pictorial composition. Total credit limited to 6 units. 3 activities. Prerequisite: ART 204, ART 302.

ART 307 Graphic Rendering (3)

Problems in felt-marker rendering techniques relative to various graphic design applications. 2 lectures, 1 laboratory. Prerequisite or concurrent: ART 301 and ART 302.

ART 308 Advanced Sculpture (3)

Advanced studio course in expressive use of form with modeling, casting, carving, and/or assembly. Miscellaneous course fee required—see *Class Schedule*. 3 activities. Prerequisite: ART 108, or ART 134, or consent of instructor.

ART 310 Art History—American Art (4)

Major historical periods of American art from the colonial period to the present. Special emphasis will be given to the broader notion of American art as a process of developing an identity of the varied historical and sociological forces which have shaped images in American art. 4 lectures. Prerequisite: ART 111, ART 213, or consent of instructor.

ART 311 Art History—Modern Art (4)

History of painting and sculpture from the French Revolution to World War I. Covers such major movements as Neo-Classicism, Romanticism, Impressionism, Post-Impressionism, Fauvism, Cubism, Expressionism, and Dada. 4 lectures. Prerequisite: ART 111, ART 112 or ART 213

ART 312 Art History—Contemporary Art (4) GEB C.3.

History of major art movements and ideologies from Surrealism to the present. Major emphasis will be placed on developments in painting and sculpture after World War II. 4 lectures. Prerequisite: ART 311, a 200-level art history course.

ART 313 Design History (3)

Survey of graphic and product design from Russian avant-garde to the present. Emphasis placed on Constructivism, Streamlining, and development of the Modern Movement in design. 3 lectures. Prerequisite: Any lower division art history course for Art majors; Junior standing for all other students.

ART 314 History of Photography (4) GEB C.3.

Photography and significant photographers from the invention of the camera obscura to the present day. Evolution of visual ideas in the medium with regard to changes in technology and society. Relationship to other visual arts and cultural impact. 4 lectures. Prerequisite: Any lower division art history course for Art majors; Junior standing and ART 111 or ART 112 for all other students; or consent of instructor.

ART 320 Fashion Photography (3)

Posing and directing models in fashion photography using 35mm and medium format cameras in black and white. Various studio lighting setups and locations techniques as they apply to advertising and editorial fashion photography. 2 lectures, 1 laboratory. Prerequisite or concurrent: ART 224.

ART 321 Photographic Expression: B/W (4)

Advanced techniques including multiple exposure, series, high contrast and digital manipulation. Emphasis on personal expression and developing style, introduction to symbology, visual source development and the work of contemporary creative photographers. 2 lectures, 2 laboratories. Prerequisite: ART 224 and ART 314.

ART 322 Color Photography I, Negative (3)

Fundamental techniques in color photography. Theory of color, visual concepts, exposing, and processing color negatives, printing from color negatives, finishing and presentation. Studio electronic flash and available light. 2 lectures, 1 laboratory. Prerequisite: ART 224.

ART 323 Color Photography II, Positive (3)

Development of consistent control of 35mm transparency exposure and printing. Introduction to digital manipulation techniques and vocabulary. Theory of color in expression and communication; exploration of both a descriptive approach and interpretive approach; a survey of contemporary color photography. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: ART 322. Recommended: CSC 113.

ART 325 4x5 Camera Techniques, B/W (3)

Basic techniques using 4x5 view cameras. Architecture, landscapes, portraiture, and other outdoor subjects used to help the student master the use of large format cameras. Other topics include exposure techniques, perspective, and sharpness correction, lighting and composition. Sensitometric approach to B/W film development and print quality emphasized. 2 lectures, 1 laboratory. Prerequisite: ART 323.

ART 326 4x5 Camera/Commercial (3)

Professional techniques with large format cameras. Outdoor and studio photography presented using B/W film and color transparencies. Topics include studio lighting for glass and metal, copying, interiors, and product photography. 2 lectures, 1 laboratory. Prerequisite: ART 325.

ART 327 Portraiture (3)

Studio and environmental portraiture. Emphasis on light ratios/patterns; posing; personality portrayal. Retouching of film and print. 2 lectures, 1 laboratory. Prerequisite: ART 224, ART 325.

ART 329 Editorial and Corporate Photography (3)

Creating, lighting and executing editorial photography. Producing photography for corporate needs, i.e. annual reports, brochures and in-house publications. Emphasis on selecting subject matter, handling lights and color film. 2 lectures, 1 laboratory. Prerequisite: ART 326.

ART 331 Typographic Design (3)

Principles of letterforms and how these principles affect the communication of ideas through graphic design. Analysis of

type style, structure, and form. Computer applications are encouraged for appropriate problems. 3 activities.

Prerequisite: Junior standing. ART majors: ART 135, ART 230 (or concurrent). GRC majors: ART 133.

ART 332 Symbology (3)

Use of symbolism, metaphor and connotative imagery in graphic design. Exploration of various problem solving methods for image-making. Computer applications are encouraged for appropriate problems. 3 activities.

Prerequisite: ART 331, junior standing.

ART 333 Corporate Identity (3)

Design and implementation of corporate logos. Development of graphic standards manuals for use of identity in diverse applications. Computer applications are encouraged for appropriate problems. 3 activities. Prerequisite: ART 332, junior standing.

ART 336 Exhibition Design/Museum Studies (3)

Theory and applied principles of exhibition design for art objects in the museum or gallery setting. Class responsible for planning and installing actual gallery exhibitions. 2 lectures, 1 laboratory. Prerequisite: ART 131, ART 134, or consent of instructor.

ART 343 Selected Advanced Topics in Glass (4)

Continued exploration into the expressive use of glass as a creative medium. Topics may include glass casting, glass blowing, mold making, and kiln work. Studio time is by arrangement. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 activities. Prerequisite: ART 108 or ART 242, or consent of instructor.

ART 344 Glass Fusing and Forming (3)

Studio course in the creative processes of fusing, forming, and assembling glass. Introduction to the use of line, color, and texture related to glass as a transparent or opaque material. Miscellaneous course fee required—see *Class Schedule*. 3 activities. Prerequisite: ART 108 or ART 242 or consent of instructor.

ART 345 Ceramics II (3)

Studio course in hand, wheel, mold, extruder, jigger, and press forming skills. Design of single and multiple forms and kiln firing procedures. Miscellaneous course fee required—see *Class Schedule*. 3 activities. Prerequisite: ART 108, or ART 134, or ART 245 or consent of instructor.

ART 346 Ceramics III (3)

Studio use of clay, slip, engobe, glaze, stoneware and raku. Contemporary craftmaker's skills are developed through use of historic and industrial techniques. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 activities. Prerequisite: ART 108, or ART 134, or ART 245 or consent of instructor.

ART 355 Metalsmithing (3)

Studio course investigating intermediate fabrication including raising, box construction and masonite dye. Exploration of surface design techniques for nonferrous metals. Emphasis on creative design solutions to problems. Miscellaneous course fee required—see *Class Schedule*. 3 activities. Prerequisite: ART 108 or ART 255, or consent of instructor.

ART 356 Jewelry Casting (3)

Introduction to casting for the jeweler with emphasis on creative design solutions to assigned problems. Use of lost wax techniques including design, wax working, casting and finishing. Miscellaneous course fee required—see *Class Schedule*. 3 activities. Prerequisite: ART 108 or ART 255, or consent of instructor.

ART 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Senior standing and consent of instructor.

ART 408 Illustration (3)

Development of techniques and conceptual skills in illustration for use in the fields of graphic design and advertising. Total credit limited to 6 units. For Applied Art and Design majors only. 3 activities. Prerequisite: ART 204, ART 302, ART 331.

ART 424 Multimedia Photography (4)

Multimedia presentation, synchronizing color slides, music, narration, and video. Contemporary, creative photography techniques applied. Creative seeing and interpretation that communicates to the viewer. 2 lectures, 2 laboratories. Prerequisite: ART 323.

ART 426 Illustration Photography I–B/W (3)

Principles of lighting and design as applied to subjects and small product studio photography. 35mm and 4x5 cameras used. Emphasis on creative problem solving, tabletop composition and lighting to produce quality image. 2 lectures, 1 laboratory. Prerequisite: ART 326 and senior standing.

ART 427 Illustration Photography II–Color (3)

Applied principles of design and color to produce a photograph that sells an idea, product, or service. 35mm and 4x5 cameras used. Emphasis on thinking, planning, interpreting, and presenting an idea photographically. 2 lectures, 1 laboratory. Prerequisite: ART 426 and senior standing.

ART 428 Commercial Photography (4)

Professional photographic techniques using large and small format cameras, color and B/W materials. Incorporates personal style. Emphasis on commercial and illustrative applications in studio and on location. Portfolio quality prints. 2 lectures, 2 laboratories. Prerequisite: ART 427 and senior standing.

ART 430 Advanced Typographic Design (3)

Advanced principles of letterform design and modification related to the communication of ideas through graphic design. Advanced analysis of type characteristics. Computer application to the typographic design processes. Miscellaneous course fee required—see *Class Schedule*. 3 activities. Prerequisite: ART 333 and senior standing.

ART 431 Package Design (3)

Graphics for food, beverage and related packaging. Positioning of products through research into typography,

imagery and color. For Applied Art and Design majors only. Computer applications are encouraged for appropriate problems. 3 activities. Prerequisite: ART 333 and senior standing.

ART 432 Advertising Design (3)

Development of print advertising from concept to marker rendering. Emphasis on art direction, photo direction and copywriting. For Applied Art and Design majors only. Computer applications are encouraged for appropriate problems. 3 activities. Prerequisite: ART 431 and senior standing.

ART 433 Editorial Design (3)

Design of editorial material, printed collateral, magazine layouts and annual reports. For Applied Art and Design majors only. Computer applications are encouraged for appropriate problems. 3 activities. Prerequisite: ART 432 and senior standing.

ART 460 Professional Practices (2)

Professional practices in the art and design field, legal and ethical questions, taxes, contracts, fees and copyrights. Current job opportunities, résumé and portfolio preparation with visiting professionals. For Applied Art and Design majors only. 2 lectures. Prerequisite: Senior standing.

ART 461 Senior Project (3)

Selection and completion of a project under faculty supervision. Minimum of 90 hours time. Results presented in a formal report. Prerequisite: Senior standing and ART 460.

ART 462 Senior Portfolio Project (1)

Preparation of portfolio system for entrance into the professional job market. 1 activity. Prerequisite: Senior standing and ART 461.

ART 463 Undergraduate Seminar (2)

Analysis of selected problems and topics for undergraduates. 2 seminars. Prerequisite: Senior standing.

ART 464 Graphics and Animation Techniques for Microcomputers (3)

Original and available software to investigate graphics generation and realtime animation techniques. Topics include BASIC vs. assembly language, brush painting, page flipping. Color graphics, sound, and music. Educational and commercial applications and marketing. 3 lectures. Prerequisite: CSC 110 or CSC 410 and CSC 207.

ART 465 Contemporary Photography Seminar (2)

Survey of significant photographers and developments in the field since 1950. The interaction between photography and the other visual arts as well as its social impact during this period. Student presentations on selected research topics. Total credit limited to 4 units. 2 seminars. Prerequisite: ART 314.

ART 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ART 471 Selected Advanced Laboratory (1-3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 laboratories. Prerequisite: Consent of instructor.

ART 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

ART 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

ASCI-ANIMAL SCIENCE

ASCI 101 Introduction to the Animal Sciences (2) (CR/NC)

Economic, environmental and societal impact of the livestock, poultry and horse industries. Basic terminology, anatomy, and physical requirements of animals. Career and academic planning. Co-curricular, extra-curricular, and post-graduate opportunities. Required of all first-time students in the Animal Sciences and Industry Department. Credit/No Credit grading only. 2 lectures.

ASCI 141 Market Beef Production (4)

Survey of industry characteristics, breeds, market classes, carcass residues, environmental protection and diet/health issues. Application of management skills, health care and behavior. 3 lectures, 1 laboratory.

ASCI 142 Swine Science (4)

Role of swine in agriculture, consideration of product quality assurance, diet/health issues and animal welfare concerns. Evaluation of brood stock and progeny product, husbandry systems, management skills, feeding systems and health management. 3 lectures, 1 laboratory.

ASCI 143 Systems of Sheep Production (4)

Types of sheep operations and geographic influence on management. The role of sheep in world agriculture. Social concerns including humane care, residues and diet/health issues. Evaluation of products, management skills, health care and behavior. 3 lectures, 1 laboratory.

ASCI 144 Equine Science (3)

Status of the horse industry. Breeds of horses and their uses. Anatomy and parts of the horse. Unsoundnesses, ailments and their treatments. Early history of the horse. 3 lectures.

ASCI 200 Special Problems for Undergraduates (2–3)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 3 units per quarter. Prerequisite: Consent of department head.

ASCI 220 Introductory Animal Nutrition and Feeding (4)

Food nutrients, identification and nutrient quality of feedstuffs and uses for each class of livestock. Ration formulation based on the digestion and utilization of feeds. Economy and least price purchasing based on nutrient content and market value of livestock. 3 lectures and 1 laboratory.

ASCI 226 Livestock Evaluation (3)

Utilization of objective and subjective estimation measures in establishing economic worth of domestic animals of the three meat animal species and horses. 1 lecture, 2 laboratories.

ASCI 231 General Animal Science (3)

Relationship of animal agriculture to society and the economy and their role for human use and consumption. Discussion of nutrition, reproduction and management of beef cattle, sheep, swine and horses. Credit not allowed for Animal Science majors. 3 lectures.

ASCI 244 Applied Horse Practices (2)

History and location of horse unit facilities and breeds maintained. Common knots, proper techniques in safely catching, leading, grooming, and restraining horses. Evaluation of desirable and faulty conformation. Preventive health program. Determining the age of a horse by dentition. Pedigree analysis. 1 lecture, 1 activity. Prerequisite or corequisite: ASCI 144 recommended.

ASCI 260 Preparation of Livestock for Shows and Sales (2)

Techniques, equipment and knowledge necessary in order to properly condition, groom, and present beef cattle or horses for evaluation and merchandising. Total credit limited to 4 units. 2 laboratories.

**ASCI 290 Livestock Management Enterprise (2–4)
(CR/NC)**

Management techniques of the livestock enterprise. Providing health, nutritional and physical care to a representative group of animals. Planning, budgeting and marketing. Instructor approval required. Prerequisites may exist for some enterprises. Total degree credit for 290/490 limited to 9 units. Credit/No Credit grading only. Prerequisite: Consent of instructor.

ASCI 304 Animal Breeding (3)

Application of genetic principles for livestock improvement. Improving production through a study of selection techniques, mating systems, and performance evaluation using current technology. 3 lectures. Prerequisite: BIO 303.

ASCI 311 Commercial Beef Management (3)

Management practices involved in the commercial beef cattle breeding enterprise. Trends and economic considerations relative to California and the U.S. Principles of selection, basic reproductive physiology, breeding systems, range management, nutrition, health programs and marketing phases of the enterprise. 3 lectures. Prerequisite: ASCI 141.

ASCI 312 Swine Management (3)

Management practices involved in commercial and purebred swine enterprises. Methods of production and marketing, performance testing programs and carcass evaluation techniques. Nutritional requirements, rations, feed additives, diseases and parasites, facilities and equipment. 3 lectures. Prerequisite: ASCI 142.

ASCI 313 Sheep Management (3)

Management practices of purebred and commercial sheep operations. Techniques, equipment, feeds, health care products and decision making throughout a production cycle from selection to culling. Exposure to emerging technologies and scientific advancements that will affect the sheep industry. 3 lectures. Prerequisite: ASCI 143.

ASCI 314 Advanced Horse Management (3)

Management practices relative to the training and conditioning of the horse. Investigation of the nutritional, behavioral and physiological parameters required of the horse in work, sport and recreational events. Miscellaneous course fee required—see *Class Schedule*. 3 lectures. Prerequisite: ASCI 144 and ASCI 244, or consent of instructor.

ASCI 326 Advanced Livestock Evaluation (2)

Application of deductive and inductive logical processes in appraising the relative merit of individual animals within a group sample. Oral expression of the selection rationale. 2 laboratories. Prerequisite: ASCI 226.

ASCI 329 Principles of Range Management (3)

Characteristics, history and multiple uses of rangeland. Principles of range plant physiology and ecology in relation to range condition, trend, utilization and improvement practices. Principles of proper grazing practices and nutrition of livestock. 3 lectures. Prerequisite: One course each in soil science, animal science and botany or crop science.

ASCI 331 Applied Range Management Practices (2)

Basic taxonomy and values of common range plants. Evaluation of range sites, soils, condition, trend and grazing utilization. Application of range technology, improvement and management practices to field situations. 1 lecture, 1 activity. Prerequisite: One course each in soil science, animal science and botany or crop science. ASCI 329 recommended.

ASCI 333 Equine Reproduction (5)

Management of the breeding farm, breeding problems, diseases, study of estrus cycles, servicing the mare, handling stallions. Breeding systems, teasing, embryo transfer, ultrasound pregnancy diagnosis, new developments in breeding technology. Miscellaneous course fee required—see *Class Schedule*. 4 lectures, 1 laboratory. Prerequisite: ASCI 144, ASCI 244.

ASCI 344 Equine and Human Communication (3)

Behavior of the horse and its relationship with people. Learning, motivation, social behavior and communication with techniques to improve the safety and understanding between people and horses. 3 laboratories. Prerequisites: ASCI 144, ASCI 244, ASCI 260 and consent of instructor.

ASCI 345 Equine Behavior Modification (3)

Advanced principles of equine behavior modification for training young horses under saddle. Identifying differences in individual horse's attitudes, techniques to teach horses to respond to various stimuli, management of young equine athlete. 3 laboratories. Prerequisite: ASCI 344 or consent of instructor.

ASCI 400 Special Problems for Advanced Undergraduates (2–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter. Prerequisite: Prior consent of department head.

ASCI 401 Reproductive Physiology (4)

Reproductive anatomy of male and female farm animals. General endocrinology and systemic physiology. Endocrine system effects on the various aspects of reproduction, such as: gametogenesis, estrus, gestation, parturition, mothering and seasonality. Introduction to reproductive biotechnology and embryo manipulation. 3 lectures, 1 laboratory. Prerequisite: VS 123.

ASCI 410 Ultrasonography (1)

Utilization of ultrasound technology for pregnancy diagnosis in sheep, beef cattle, swine and horses and live animal carcass estimation in sheep, beef cattle and swine. 1 laboratory. Prerequisite: FSN 211, ASCI 401, VS 123 and senior standing.

ASCI 420 Animal Nutrition (3)

Metabolism of proteins, carbohydrates, lipids, minerals, vitamins and water, and the relationship of nutrient utilization to animal production. 3 lectures. Prerequisite: ASCI 220 and CHEM 326 (or CHEM 316 and CHEM 317).

ASCI 421 Animal Nutrition (Pre-Veterinary and Graduate Students) (3)

Nutrient metabolism and the relationship of nutrient metabolism and utilization to metabolic dysfunctions and food-animal production. 3 lectures. Prerequisite: ASCI 220 and CHEM 328 (or CHEM 371 and CHEM 372).

ASCI 461 Senior Project (2)

Selection of a project and an ASCI 462 adviser, formulation of an outline and a literature review. Projects selected in the student's expected field of employment. Outline and literature review will be presented as part of the ASCI 462 final report. Minimum 60 hours. 2 seminars. Prerequisite: Senior standing.

ASCI 462 Senior Project (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 60 hours.

ASCI 463 Undergraduate Seminar (2)

Major developments in the chosen field of the student. Discussion of new developments, policies, practices, and procedures. Each individual is responsible for the development and presentation of a topic in the chosen field. 2 seminars.

ASCI 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ASCI 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 laboratories. Prerequisite: Consent of instructor.

ASCI 476 Issues in Animal Agriculture (3)

Exploration of social, political and environmental forces which will affect livestock production in the future. Roles played by advocacy groups and the media in influencing consumer demands and management practices. 3 seminars. Prerequisite: Upper division standing.

ASCI 490 Advanced Livestock Management Enterprise (2–4) (CR/NC)

Intensified management of specialized livestock enterprises in all species areas. Application of applied research and progressive husbandry practices employed. Industry contact and visitation encouraged. Specified class prerequisites and consent of instructor required. Total degree credit for 290/490 limited to 9 units. Credit/No Credit grading only. Prerequisite: Specified classes and consent of instructor.

ASCI 581 Graduate Seminar in Animal Production (3)

Current findings and research problems in the field and their application to the industry. 3 seminars.

ASM–AGRICULTURAL SYSTEMS MANAGEMENT**ASM 141 Agricultural Machinery Safety (3)**

Evaluation of safe tractor and equipment operation. Supervised field operation emphasizing the safe and efficient performance of modern farm and utility-industrial equipment. 2 lectures, 1 laboratory.

ASM 142 Agricultural Power and Machinery Management (4)

Evaluation of agricultural machinery and tractor power performance. Equipment studied includes primary and secondary tillage tools, grain drills, row crop planters, sprayers, grain and forage harvesters, and specialty crop harvesters. Emphasis on management, selection, cost analysis using computers and efficient operation of agricultural machinery. 3 lectures, 1 laboratory. Prerequisite: MATH 116 or equivalent.

ASM 203 Agricultural Systems Analysis (3)

Agricultural Systems Analysis investigates the interrelationships between sub-components in an overall system. Problem solving algorithms, network analysis, project planning techniques, and optimization. 2 lectures, 1 laboratory. Prerequisite: MATH 116 or equivalent.

ASM 324 Principles of Agricultural Electrification (4)

Applications of DC/AC electricity in agriculture. National Electric Code regulations. The wiring of agricultural structures and electrical distribution. Series, parallel and series-parallel circuits, R-L-C circuits, electric motors, electronics. 3 lectures, 1 laboratory. Prerequisite: MATH 119 or MATH 120, PHYS 104.

ASM 325 Agricultural Energy Systems (3)

Use of energy systems in modern agriculture with a focus on the economic and moral dilemmas facing our technological society. 2 lectures, 1 laboratory. Prerequisite: PHYS 104, ASM 142.

ASM 402 Agricultural Materials (3)

Introduction to the physical aspects and properties of a wide variety of materials encountered in the field of agriculture. Physical interactions between agricultural commodities and the machines used in handling. 2 lectures, 1 laboratory. Prerequisite: ASM 325.

ASM 432 Agricultural Buildings (4)

Selection of buildings, storage units, and related equipment for production agriculture. Economics and functionality of various designs and construction materials. Environmental factors affecting crop storage and animal housing. 3 lectures, 1 laboratory. Prerequisite: PHYS 104, ASM 402.

ASM 463 Undergraduate Seminar (1)

Group discussion of current agricultural engineering topics presented by individual members of the class and visitors. Placement opportunities and requirements. 1 seminar.

ASTR-ASTRONOMY AND ASTROPHYSICS

ASTR 101 Introduction to the Solar System (3) GEB B.1.a.

Descriptive astronomical properties of the Earth, Moon, other planets and their satellites. Comets, asteroids and other members of the Solar System. Theories of the formation of the Solar System. Opportunities for telescope observations of the Moon and planets. Not open to students who have completed or are taking ASTR 301, or PHYS 132. 3 lectures.

ASTR 102 Introduction to Stars and Galaxies (3)**GEB B.1.a.**

Descriptive astronomical properties of the Sun, stars, galaxies, and interstellar material. Expanding universe and cosmological models. Opportunities for telescope observations and star identification. Not open to students who have completed or are taking ASTR 301, ASTR 302, or PHYS 132. ASTR 101 is not a prerequisite. 3 lectures.

ASTR 301 The Solar System (3)**GEB B.1.a.**

Quantitative and descriptive properties of the Solar System including the physics of the planets, their satellites, comets and interplanetary media. Possible origins of the Solar System. Not open to students who have completed ASTR 101. 3 lectures. Prerequisite: PHYS 132 or PHYS 123.

ASTR 302 Stars and Galaxies (3)**GEB B.1.a.**

Quantitative and descriptive properties of the stars, galaxies and interstellar media; including stellar structure and

evolution, structure and make-up of galaxies and cosmological models. Not open to students who have completed ASTR 102. 3 lectures. Prerequisite: PHYS 132 or PHYS 123. ASTR 301 is not a prerequisite.

ASTR 303 Relativity and Cosmology (3)**GEB B.1.a.**

Introduction to the basic ideas of Einstein's theories of relativity and cosmology. The structure and evolution of the universe. The principle of relativity, the speed of light, gravity and the equivalence principle. Curved spacetime, black holes, the expanding universe, the Big Bang, and nucleosynthesis. 3 lectures. ASTR 302 is not a prerequisite. Prerequisite: PHYS 122 or PHYS 132.

BACT-BACTERIOLOGY

BACT 221 General Bacteriology (4)**GEB B.1.b.**

Morphology, metabolism, classification and identification; bacteriology of air, soil, water, and foods with applications to industry, agriculture, medicine, and public health. 2 lectures, 2 laboratories. Prerequisite: One quarter of chemistry.

BACT 222 General Microbiology (5)**GEB B.1.b.**

Genetics and ecology of microorganisms. Host-parasite relationships, mechanisms of genetic transfer in bacteria, and physiologic and ecologic aspects of various microbial groups will be emphasized. 3 lectures, 2 laboratories. Prerequisite: BACT 221.

BACT 322 Dairy Microbiology (4)**GEB B.1.b.**

Methods used in the isolation, identification and enumeration of microorganisms important to the dairy industry, with emphasis on those instrumental in dairy fermentations and ripening processes, those used as sanitary indicators, and on major spoilage organisms. 2 lectures, 2 laboratories. Prerequisite: BACT 221 or BACT 224.

BACT 333 Industrial Microbiology (4)**GEB B.1.b.**

Microbial biotechnology in producing pharmaceuticals, food additives, and industrial chemicals. Consideration of selected large-scale processes for producing primary and secondary metabolites. 2 lectures, 2 laboratories. Prerequisite: BACT 221 or BACT 224, CHEM 326 or equivalent.

BACT 342 Sanitary Microbiology (4)**GEB B.1.b.**

Principles of disease prevention and control. Water-, food-, and air-borne microbial contaminations and epidemiology of ensuing diseases. Laboratory techniques in detection and control of wastes and disease-causing microorganisms. 2 lectures, 2 laboratories. Prerequisite: BACT 221 or BACT 224.

BACT 402 General Virology (3)

Virus-host interactions. Structure and function of viruses as obligate intracellular parasites of microbes, plants, and animals. Epidemiology, pathogenesis, prophylaxis, chemotherapy, and manipulation of viruses which parasitize humans. 3 lectures. Prerequisite: BACT 225 and CHEM 328 or equivalent. Recommended: ZOO 426.

BACT 403 General Virology Laboratory (2)

Methods of culture, characterization and identification of viruses, with emphasis on viruses parasitic in microorganisms, humans, and animals. 2 laboratories.

Prerequisite or concurrent: BACT 402 and consent of instructor.

BACT 421 Food Microbiology (4)

Physiological activities of microorganisms involved in the preparation, preservation, deterioration and toxicity of foods and related products. 2 lectures, 2 laboratories. Prerequisite: BACT 221 or BACT 224. Recommended: CHEM 326.

BACT 423 Medical Microbiology (5)

Microorganisms as agents of disease in humans. Epidemiology, host-parasite relationships, and chemotherapy. The compromised host and opportunistic disease. Laboratory safety. Procedures for laboratory diagnosis of human diseases. Rapid miniaturized methods of identification. 3 lectures, 2 laboratories. Prerequisite: BACT 225 and BACT 226. Recommended: Organic Chemistry.

BACT 424 Bacterial Cytology and Physiology (5)

Cellular structure and life processes of bacteria; chemical composition, growth and metabolism. General biological and evolutionary considerations. 3 lectures, 2 laboratories. Prerequisite: BACT 225 and CHEM 328.

BACT 430 Medical Mycology (4)

Morphology, physiology, infectivity, and immunogenicity of fungi pathogenic for man and other mammals. Host-parasite interactions. Demonstration and isolation of pathogenic fungi from clinical material. 2 lectures, 2 laboratories. Prerequisite: BIO 152, BIO 153, and BACT 423.

BIO-BIOLOGY

BIO 100 Orientation to Biological Sciences (1) (CR/NC)

Career opportunities in the biological sciences, designing a career goal and a survey of departmental facilities and procedures related to research, study and graduation. Credit/No Credit grading only. 1 lecture.

BIO 101 General Biology (3) GEB B.1.b.

Principles of cellular biology, heredity, ecology, and evolution, with emphasis on their relationship to human affairs. Not open for credit to students who have completed BIO 151 or BOT 121 or ZOO 131. 3 lectures.

BIO 105 General Biology Laboratory (1) GEB B.1.b.

Observations and experiences involving basic principles in the biological sciences. Emphasis on the diversity of living systems. Cell structure and function. Genetics and ecological relationships. 1 laboratory. Concurrent or previous enrollment in BIO 101.

BIO 127 Natural History: Animal Adaptations (3) GEB B.1.b.

Interpretation of structural and functional adaptations of animals; emphasis on phenomena readily observed in the field. Laboratory exercises emphasize insects as examples. 2 lectures, 1 laboratory.

BIO 128 Natural History: Animal Communities (3) GEB B.1.b.

Examination of local biotic communities, emphasizing identification and natural history of the animals which inhabit

them. Field experience in local communities. 2 lectures, 1 laboratory, 2 Saturday field trips. Recommended: BIO 127.

BIO 129 Natural History: Plant Communities (3) GEB B.1.b.

Principles of field biology and ecology; laboratory and field study of land and freshwater plant communities, emphasizing identification of plants inhabiting them. 1 lecture, 2 laboratories, Saturday field trips. Recommended: BIO 128.

BIO 151 Introduction to Biology (5) GEB B.1.b.

Fundamental principles of biology with emphasis on the physical and chemical basis of life; cytology; bioenergetics; storage; processing and expression of genetic information; ecology; evolution. 3 lectures, 2 laboratories. Recommended prerequisite: Concurrent or previous enrollment in college chemistry course.

BIO 152 Biology of Plants and Fungi (5) GEB B.1.b.

Structure, ecology, reproduction, and evolution of fungi, cyanobacteria, algae, and plants. 3 lectures, 2 laboratories. Prerequisite: BIO 151.

BIO 153 Biology of Animals (5) GEB B.1.b.

Survey of the protist and animal kingdoms; fundamentals of animal form and function. 3 lectures, 2 laboratories. Prerequisite: BIO 151.

BIO 205 Traces Through Time (3) (Also listed as PSC 205) GEB B.1.a. or B.1.b.

Survey of evidence supporting evolution including origin of the universe, radiometric dating, structure of Earth and plate tectonics. Evolutionary evidence from chemistry, biology, fossils, and the geographical distribution of life. Fundamental differences between science and creationism will be explored. A student using this course for GEB credit also must take at least one other course in Area B.1.b. and at least one other course in Area B.1.a. 3 lectures.

BIO 220 Physiology and Biological Adaptation (4) GEB B.1.b. and E.2.

Physiological principles with integration of principles of adaptation of life processes among living organisms. Not open for credit to students who have completed ZOO 131. 4 lectures. Prerequisite: Completion or simultaneous enrollment in college level chemistry.

BIO 253 Orientation to the Health Professions (1) (CR/NC)

Participation in hospital activities and mental health services. Intended for medically oriented students. Total credit limited to 6 units with a maximum of 1 unit per quarter. Credit/No Credit grading only. 1 activity. Prerequisite: Instructor's consent and one quarter of college chemistry and BIO 153 or ZOO 131.

BIO 300 Biology of Cancer (2)

Molecular, cellular and immunological aspects of cancer. Types of cancer and modes of treatment. Environmental, psychological and sociological implications. Cancer research. Not for Biology credit for Biological Sciences majors. 2 lectures.

BIO 301 Human Ecology (3) GEB B.1.b.

Examination of the ways in which humans are dependent on their environment, their ability to modify it, and the results of such modification. 3 lectures. Prerequisite: One quarter of biological science.

BIO 302 Human Genetics (3) GEB B.1.b.

Basic principles of human inheritance. Transmission of genetic traits, chromosomal anomalies of humans, gene action, mutations and mutagenic agents, eugenics, and principles of genetic counseling. Not for Biology credit for Biological Sciences majors. 3 lectures. Prerequisite: One course in college biology (preferably BIO 101, BIO 151, or ZOO 131).

BIO 303 Genetics (3) GEB B.1.b.

Principles of heredity and variation. 3 lectures. Prerequisite: One quarter of college biology and one quarter of college mathematics. Recommended: STAT 211.

BIO 304 Molecular Genetics (3) GEB B.1.b.

Introduction to the structures, functions, and regulatory mechanisms of nucleic acids in biological systems. 3 lectures. Prerequisite: One quarter of college biology. Recommended: BIO 303 and one course in biochemistry.

BIO 306 Applications of Biological Concepts (4)

Applications of basic biological concepts with special reference to how these concepts can be presented and developed in elementary schools. Emphasis is on hands-on activities, problem solving and computer assisted instruction modules in biology. 3 lectures, 1 laboratory. Prerequisite: BIO 101 and BIO 105, or equivalent.

BIO 311 Radiation Biology (3) GEB B.1.b.

Review of production and characteristics of non-ionizing and ionizing radiation; interaction and effect of radiation on living cells, tissues, organs, and organisms; introduction to use of radioisotopes; radiation protection and dosimetry; impact of nuclear energy on the biological world. 3 lectures. Prerequisite: CHEM 122 or CHEM 128 and one of the following: BIO 101, BIO 151, BOT 121, ZOO 131.

BIO 321 Biological Instrumentation (3)

Theory and operation of instruments commonly used in biological investigation. 1 lecture, 2 laboratories. Prerequisite: BIO 151, BOT 121 or ZOO 131.

BIO 322 Introduction to Electron Microscopy (2)

Introduction to principles and theory of scanning and transmission electron microscopy including instruments utilized in study of biological and nonbiological specimens. 1 lecture, 1 activity. Prerequisite: BIO 151, BOT 121 or ZOO 131 or consent of instructor.

BIO 323 Scanning Electron Microscopy Laboratory (1)

Techniques of using the scanning electron microscope including preparing, examining and interpreting biological and nonbiological materials. 1 laboratory. Prerequisite or concurrent enrollment in: BIO 322.

BIO 324 Transmission Electron Microscopy Laboratory (2)

Applications of transmission electron microscopy including in-depth training in specimen preparation and use of the

microscope. Design of experiments and interpretation of results will be included in laboratory. 2 laboratories. Prerequisite or concurrent enrollment in: BIO 322.

BIO 325 General Ecology (4) GEB B.1.b.

Interactions between living organisms and their environment in terrestrial and aquatic habitats. 3 lectures, 1 laboratory. Prerequisite: BIO 152 and BIO 153.

BIO 328 Marine Biology (4) GEB B.1.b.

Biological and environmental studies of marine organisms, with emphasis on their economic importance. 2 lectures, 2 laboratories. Prerequisite: BIO 152 or BIO 153, or consent of instructor.

BIO 330 Biology of Aging (3) GEB B.1.b.

Theories of aging, the biological principles involved, and the current status of research in the field. 3 lectures. Prerequisite: College-level course in biology. Recommended: An introductory course in chemistry.

BIO 334 Limnology (3) GEB B.1.b.

Biological, physical, and chemical dynamics of freshwater ecosystems. 2 lectures, 1 laboratory. Prerequisite: BIO 325. Recommended: One college level course in chemistry.

BIO 342 Computer Applications in Biology (3)

Applications of computers and data processing technology to the understanding and solving of specific problems in biology. 2 lectures, 1 laboratory. Prerequisite: One college level course in biological science and one course in computer science.

BIO 375 Molecular Biology Laboratory (2) (Also listed as CHEM 375) GEB B.1.b.

Techniques used in molecular biology and biotechnology, plasmid DNA extraction, agarose gel electrophoresis, restriction endonuclease mapping, transduction, transformation, and gene cloning. 2 laboratories. Prerequisite: BACT 221 or BACT 224 and BIO 304 or CHEM 373.

BIO 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

BIO 414 Evolution (3)

Scientific evaluation of the theories, mechanisms, and evidences concerning biological evolution. 3 lectures. Prerequisite: BIO 303.

BIO 415 Biogeography (3)

Plant and animal distribution patterns in relation to past and present physical and biotic factors; continent by continent survey of biogeography with major emphasis on North America. 3 lectures. Prerequisite: BIO 325.

BIO 423 Cell Biology (4)

Detailed study of the structure and function of animal and plant cells. 3 lectures, 1 laboratory. Prerequisite: BIO 152 and BIO 153 or ZOO 131 and BOT 121 and organic chemistry or biochemistry.

BIO 424 Organizing and Teaching Biological Sciences (3)

Objectives, content, techniques, material, and recent trends of successful instruction in secondary school biology. 3 lectures. Prerequisite: Consent of instructor.

BIO 426 Cytogenetics (4)

Cytological basis of genetics. Correlation between genetic principles and chromosome behavior by studying mitotic and meiotic cells. Cytological study of hybrids, polypoids and chromosomal aberrations in plants and animals. 3 lectures, 1 laboratory. Prerequisite: BIO 303.

BIO 431 Physiology I: General (4)

Functioning, control, and integration of physiological phenomena at various levels from cell to organism. 2 lectures, 2 laboratories. Prerequisite: CHEM 326; BIO 152 or BIO 153.

BIO 437 Marine Resources (3)

Resource status of present and potential biological marine resources of the sea. Identification, life history, ecology, culture and economics of pertinent organisms. 3 lectures. Prerequisite: BIO 152 and ZOO 336.

BIO 442 Biometry (4)

Design of biological experiments with emphasis on sampling methods, data collection, mensuration, and analysis of field and laboratory data. 3 lectures, 1 recitation. Prerequisite: One year of biology, STAT 212 or STAT 321 and completion of computer literacy requirement.

BIO 461, 462 Senior Project (3) (2)

Projects are selected from typical problems which graduates may meet in areas of their future employment. Results are presented in written reports. Minimum 150 hours total time.

BIO 463 Undergraduate Seminar (2)

Study and discussion of recent developments in the field of biology. 2 seminars. Prerequisite: Senior standing.

BIO 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

BIO 471 Selected Advanced Laboratory (1-2)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topics selected. Total credit limited to 4 units. 1 to 2 laboratories. Prerequisite: Consent of instructor.

BIO 475 Tissue Culture Techniques (4) (Also listed as CHEM 475)

Introduction to the principles and methods of tissue culture with emphasis on the manipulation and study of animal cells. 2 lectures, 2 laboratories. Prerequisite: BACT 221 or BACT 224, BIO 303 and CHEM 328 or CHEM 371.

BIO 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by

work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

BIO 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

BIO 500 Individual Study (1-3)

Advanced study planned and completed with the approval of and under the direction of a member of the department faculty. A written scholarly presentation of the results of each BIO 500 project must be included in the graduate student's departmental file. Not open for credit to students in the thesis program. Total credit limited to 4 units. Prerequisite: Graduate standing and consent of instructor.

BIO 501 Cellular Biology (3)

Consideration of recent studies on the energetics, synthesis, regulation, genetics, transport, movements, reproduction, and differentiation of cells. 2 seminars, 1 activity. Prerequisite: Graduate standing and/or consent of instructor.

BIO 502 Biology of Organisms (3)

Consideration of recent advances in the knowledge of organisms; their morphology, systems of maintenance, organization and integration, responsiveness and behavior, development and reproductive processes. 2 seminars, 1 activity. Prerequisite: Graduate standing and/or consent of instructor.

BIO 503 Population Biology (3)

Consideration of current theory and practice in evolution, genetics, ecology and systematics of organisms. 2 seminars, 1 activity. Prerequisite: Graduate standing and/or consent of instructor.

BIO 515 History of Biology (3)

Analysis of historical attempts to solve biological problems. 3 seminars. Prerequisite: Graduate standing and/or consent of instructor.

BIO 524 Developmental Biology (3)

Developmental phenomena of higher and lower plants, vertebrate and invertebrate animals at the molecular, cellular, histological and organ levels. Each quarter will emphasize a different biological description. Total credit limited to 9 units, with a maximum of 3 units per quarter. 2 seminars, 1 laboratory. Prerequisite: Graduate standing and/or consent of instructor.

BIO 531 Theory and Prediction in Ecology (2)

Directed group study and lectures on selected topics in ecology. Emphasis on an in-depth study of a restricted topic. 2 seminars. Prerequisite: Graduate standing and/or consent of instructor.

BIO 542 Multivariate Biometry (4)

Design of biological experiments involving multivariate observations. Experimental design, sampling, computer

analysis, and interpretation of results. 3 seminars, 1 laboratory. Prerequisite: STAT 313, BIO 442.

BIO 543 Morphometrics (3)

Biological phenomena from problem definition and field collection of data through multivariate analysis of data and presentation of results. 2 seminars, 1 laboratory, 2–4 weekend field trips. Prerequisite: BIO 542.

BIO 570 Selected Topics in Biology (1–3)

Directed group study of selected topics for graduate students. *Class Schedule* will list topics for selection. Total credit limited to 9 units. 1 to 3 seminars. Prerequisite: Graduate standing and/or consent of instructor.

BIO 585 Cooperative Education Experience (6) (CR/NC)

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

BIO 590 Seminar in Biology (1)

Problems and topics in advanced biology selected according to the interest and needs of the students enrolled. Total credit limited to 5 units. 1 two-hour seminar. Prerequisite: Graduate standing and/or consent of instructor.

BIO 595 Cooperative Education Experience (12) (CR/NC)

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

BIO 599 Thesis (3)

Individual research under the general supervision of the faculty, leading to a graduate thesis of suitable quality. Total credit limited to 9 units. Prerequisite: Graduate standing, consent of instructor, and consent of thesis committee.

BOT–BOTANY

BOT 121 General Botany (4) GEB B.1.b.

Introduction to structures and functions of seedbearing plants. 2 lectures, 2 laboratories.

BOT 223 Introductory Plant Taxonomy (4) GEB B.1.b.

Introduction to classification and identification of vascular plants, emphasizing major plant families; field and herbarium techniques. 2 lectures, 2 laboratories. Prerequisite: BIO 152 or BOT 121.

BOT 238 Native Plant Materials (3)

Classification, identification, and associations of native plants. Factors which affect plant growth in natural environments. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: BOT 121.

BOT 322 Introductory Plant Physiology (4) GEB B.1.b.

Consideration of the principal physiological processes of plants including water relations, mineral nutrition, photosynthesis, respiration, and growth of the plant. 3 lectures, 1 laboratory. Prerequisite: BIO 152 or BOT 121, and CHEM 326.

BOT 323 Plant Pathology (4) GEB B.1.b.

Comprehensive study of the causes and effects of disease in plants. Designed to lead to an understanding of the science and modern control methods. 2 lectures, 2 laboratories. Prerequisite: BIO 152 or BOT 121.

BOT 324 Ornamental and Forest Pathology (4) GEB B.1.b.

Causes and effects of diseases of important ornamental and forest plants, disease agents (life cycle, host range, environmental relationships), and modern approach to control. 2 lectures, 2 laboratories. Prerequisite: BIO 152 or BOT 121.

BOT 325 Plant Nematology (4) GEB B.1.b.

Plant parasitic nematodes, their morphology, classification, and the damage they cause plants, alone or in combination with other pathogens. 2 lectures, 2 laboratories. Prerequisite: BOT 323 or BOT 324.

BOT 326 Plant Ecology (4) GEB B.1.b.

Plant communities, population dynamics, and effects of the following environmental factors on plant growth and development: soil, water, temperature, light, atmosphere, topography, organisms, and fire. 3 lectures, 1 laboratory. Prerequisite: BOT 223.

BOT 333 Field Botany (4) GEB B.1.b.

Plant communities of California. Field identification of native and introduced plants in nature. Factors affecting plant distribution and relationships. Emphasis on local species. Several field trips. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: BOT 223.

BOT 334 Morphology of Vascular Plants (4) GEB B.1.b.

Phylogenetic relationships of the plant kingdom as illustrated by comparative morphology of the vascular plants including living and fossil forms. 2 lectures, 2 laboratories. Prerequisite: BIO 152 and BOT 223.

BOT 335 Plant Anatomy (4) GEB B.1.b.

Microscopic study of vascular plants dealing with the origin, development and structure of cells, tissues and organs. 2 lectures, 2 laboratories. Prerequisite: BIO 152 or BOT 121.

BOT 425 Plant Virology (4)

Plant pathogenic viruses, their plant, insect, nematode and fungal host-pathogen relationships, symptom recognition, isolation and identification methods. 2 lectures, 2 laboratories. Prerequisite: BOT 323 or BOT 324.

BOT 426 Mycology (4)

Comparative morphology and nuclear behavior of the fungi. Summary of the science with special attention given to forms important in agriculture, medicine and industry. 2 lectures, 2 laboratories. Prerequisite: BIO 152 or BOT 121.

BOT 431 Advanced Plant Pathology (4)

Methods, instruments, and materials used in diagnosis of plant diseases and in plant disease research. 2 lectures, 2 laboratories. Prerequisite: BOT 323 or BOT 324.

BOT 437 Algology (4)

Classification of marine and fresh-water algae. Consideration of ecological, physiological and economic aspects. 2 lectures, 2 laboratories. Prerequisite: BIO 152.

BOT 443 Systematic Botany (3)

Current theory of and approaches to botanical systematics, including use of morphological, cytological, biochemical, ecological and evolutionary data in classification. Rules of botanical nomenclature. 2 lectures, 1 laboratory. Prerequisite: BOT 223.

BOT 450 Plant Cell and Tissue Culture (5)

Principles and methods of plant cell and tissue culture important to industry and basic science. 3 lectures, 2 laboratories. Prerequisite: BOT 322.

BUS-BUSINESS

BUS 100 Study Skills Adjunct (2) (CR/NC)

Offered concurrently with BUS 101 to assist students in developing and improving their study skills, textbook comprehension, critical analysis, application and retention of the subject matter presented in the specific content course. Credit/No Credit grading only. 1 lecture, 1 activity.

BUS 101 The Business Enterprise (4)

Orientation to the business administration program. Examination of the business enterprise, stressing its historical, environmental, and economic setting. Business organization and functions. 4 lectures.

BUS 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

BUS 201 Business Law Survey (3)

Overview of business law for other than business majors. Similar in scope to BUS 207, but in less detail. Not acceptable for credit toward Business Administration degree. 3 lectures.

BUS 207 Business Law (4)

American legal system, contracts, agency, business organizations, and real property. Case studies. 4 lectures. Prerequisite: Sophomore standing.

BUS 308 Business Law II (4)

Legal aspects of management decisions, including problems arising in sales, commercial paper, personal property and bailments, secured transactions, bankruptcy, and securities regulation, with emphasis on the uniform commercial code. Case studies. 4 lectures. Prerequisite: BUS 207 or equivalent and junior standing.

BUS 400 Special Problems for Advanced Undergraduates (1-4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Senior standing or consent of instructor.

BUS 404 Governmental and Social Influences on Business (4) GEB D.4.b.

Analysis from legal, economic, political, and ethical perspectives, of the changing domestic and international environments of the business enterprise. Topics include administrative law and regulatory policy, antitrust law, public policy analysis, and the interaction of business and government. Case studies. 4 lectures. Prerequisite: Senior standing.

BUS 411 Legal Aspects of High Technology Management (4)

Practical legal decisions required to conduct business for or with high technology companies. Examination of methods to protect high technology developments, including copyrights, patents, trade secrets, trademarks and contracts. Case studies. 4 lectures. Prerequisite: BUS 207 or equivalent.

BUS 430 Internship (2-4) (CR/NC)

Placement as an employee in a business firm approved by the department head. Periodic written progress reports required. Collateral reading correlated with the work experience. Credit/No Credit grading. Prerequisite: Approval of department head.

BUS 461, 462 Senior Project (2) (2)

Selection and analysis of a problem under faculty supervision. Problems typical of those which graduates must solve in their fields of employment. Formal report is required. Minimum 120 hours total time. For Finance and Marketing Concentration students only.

BUS 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1-3 lectures. Prerequisite: Consent of instructor.

BUS 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

BUS 490 The Legal Environment of International Business (4)

U.S. Law, International Law and Foreign Law affecting international business. The cultural and political settings of foreign law. The world's legal traditions and systems. Case analysis. 4 lectures. Prerequisite: Senior standing, a course in American business law, one Political Science course, or consent of instructor.

BUS 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

BUS 500 Independent Study (1-4)

Advanced study planned and completed under the direction of a member of the Business Administration department faculty. Open only to graduate students who have demonstrated ability to do independent work. Prerequisite: Formal petition with approval.

CE-CIVIL ENGINEERING**CE 111 Civil Engineering Fundamentals I (1) (CR/NC)**

Description of the field of civil engineering and the function of the professional civil engineer. Introduction to the major subdivisions of civil engineering including environmental, geotechnical, structural, and water resource engineering. Credit/No Credit grading only. 1 lecture.

CE 112 Civil Engineering Fundamentals II (2)

Continuation of CE 111. Application of basic design criteria to specific design problems, use of Civil Engineering department library computer programs for planning, analysis, and design. 1 lecture, 1 laboratory. Prerequisite: MATH 141, PHYS 131.

CE 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

CE 204, 205 Strength of Materials (3) (2)

Stresses, strains and their relations applied to axial, torsional and flexural loads. Statically indeterminate axial members, beams and shafts. Columns, dynamic loads, repeated loads. Tension, compression, bending, shear, and torsion tests. Use of the SR-4 strain rosette for determining principal strains. CE 204: 3 lectures; CE 205: 2 lectures. Prerequisite: ME 211, CE 204 (for CE 205).

CE 206 Strength of Materials Laboratory (1)

Physical properties of engineering materials. Tension, compression, bending, shear, and torsion tests. Stress and strain transformation. Current strain gauge technology. 1 laboratory. Concurrent: CE 205.

CE 221 Fundamentals of Transportation Engineering (4)

GEB F.2.

Review of highway, air, rail, mass transit and other modes of transportation. Evolution of U.S. transportation systems. Transportation planning and operations. Feasibility analysis. Systems analysis, policy and management. 3 lectures, 1 laboratory. Prerequisite: MATH 141.

CE 259 Civil Engineering Materials (2)

Experimental determination of mechanical properties of concrete, asphalt, and soils as required for engineering

applications. Experimental verification of assumptions made in mechanics of materials procedures. Use of strain measuring devices. Preparation of technical reports. 2 laboratories. Prerequisite: CE 204.

CE 336 Water Resources Engineering (4)

Hydraulics of open channel flow, flow through hydraulic structures, stream flow and stream flow hydrographs, hydrologic routing. 4 lectures. Prerequisite: CE 112, ME 341.

CE 337 Hydraulics Laboratory (1)

Application of basic fluid dynamic principles to various mechanical systems. Exposure to experimental problems and techniques with guided laboratory projects related to civil engineering discipline. 1 laboratory. Prerequisite: ME 341.

CE 352, 353 Structural Analysis I, II (3) (3)

General structural theorems, energy methods, influence diagrams, deflection of structures, analysis of statically determinate and indeterminate structures. Introduction to matrix methods of analysis and dynamic response. 3 lectures. Prerequisite: CE 204, CE 205.

CE 355 Reinforced Concrete Design (3)

Analytical and design principles of reinforced concrete in designing civil engineering systems. Origin of code requirements. Fundamentals of proportioning. Details of elements and structural systems. 3 lectures. Prerequisite: CE 259, CE 353.

CE 381 Geotechnical Engineering (4)

Elementary mass-volume relations, clay-water interaction, soil classification, geostatic stress distributions, 1-D and 2-D steady-state flow. Consolidation settlement and rate of consolidation. Shear strength under drained and undrained conditions. Standard laboratory testing. 3 lectures, 1 laboratory. Prerequisite: CE 205, ME 341.

CE 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

CE 405 Advanced Strength of Materials (3)

Equations of equilibrium and continuity in elastic solids. Generalized Hooke's Law. Two-dimensional solutions of beams, disks, rings under various loading conditions. Stress concentrations and their engineering significance. Strain-energy methods of solution. Fundamentals of plates and shells. 3 lectures. Prerequisite: CE 353, senior standing.

CE 407 Structural Dynamics (4)

Effect of vibration and transient loads on structural elements. Dynamics load factors, support motion, damping and natural frequencies of multidimensional structural systems. Modal analysis. 3 lectures, 1 laboratory. Prerequisite: CE 353, ME 212.

CE 421 Traffic Engineering (4)

Elements of ground circulation and planning. Driver and vehicle performance. Traffic counting analysis and control. Planning of ground transportation units and terminals as

elements of complete transportation systems. 3 lectures, 1 laboratory. Prerequisite: CE 221 or consent of instructor.

CE 422 Highway Geometrics and Design (4)

Location and safe geometric design of highway and other transportation facilities. Earthwork and drainage related to highway, railway, dock, and airport design. Theory and practice in design of alignments, highway cross-sections, intersections, interchanges, and freeways in urban and rural areas. 3 lectures, 1 laboratory. Prerequisite: CE 221 or consent of instructor.

CE 424 Public Transportation (4)

Interdisciplinary aspects of public transportation problems, systems-team design approach to solutions. History and present state of public transportation; role of public transportation in urban environment; legislative, political, social, and economic aspects of public transportation systems. Methodology and procedures for transit planning. Review of transit studies. 3 lectures, 1 laboratory. Prerequisite: CE 221 or consent of instructor.

CE 431 Coastal Hydraulics (3)

Waves and their characteristics, types of waves, water wave theories, orbital velocities, refraction of waves, wave diffraction, wave reflection, application of linear theory to wave forces on cylindrical structures, submerged pipelines and vertical flat barriers (sea walls), wave uprush, rubble mound breakwaters. 3 lectures. Prerequisite: ME 341.

CE 434 Groundwater Hydraulics and Hydrology (3)

Differential equations of groundwater flow, Darcy Law, solutions of the steady and unsteady flow, differential equations for confined and unconfined flows. Pumping test design. Groundwater models, leaky aquifers. Saltwater intrusion. 3 lectures. Prerequisite: CE 336.

CE 440 Hydraulic Systems Engineering (3)

Water and wastewater flows. Design of water distribution systems, transmission and storage reservoirs, wastewater collection systems, and storm water systems. Pumps and pump systems, flow measurements. Water sources for municipal supply. 3 lectures. Corequisite: CE 336.

CE 453 Structural Steel Design (3)

Design and behavior of the elements of steel structures. Proportioning of members and connections. Introduction to plastic design. 3 lectures. Prerequisite: CE 353.

CE 454 Structural Design (4)

Design of reinforced concrete, steel and timber structures. Loading standards, code design methods, connection design. Comprehensive design projects. 2 lectures, 2 laboratories. Prerequisite: CE 353, CE 355, CE 453.

CE 461, 462 Senior Project (2) (2)

Selection and completion of a project which is typical of problems which graduates must solve in their fields of employment. Project results are presented in a formal report. Minimum 120 hours total time. Prerequisite: Senior standing.

CE 464 Professional Practice (3)

Principles of professional engineering practice, the consulting engineer, engineering management, engineer-client relationships, professional ethics, marketing of engineering

services, engineering agreements, case studies, analysis of uncertainty in engineering design. 3 seminars. Prerequisite: Upper division standing.

CE 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

CE 471 Selected Advanced Laboratory (1-3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 laboratories. Prerequisite: Consent of instructor.

CE 481 Analysis and Design of Shallow Foundations (4)

Subsurface exploration and sampling techniques. Stress distribution beneath footings. Bearing capacity and settlement analyses for footings and mats. Design of reinforced concrete spread footings. Methods for reducing settlement and accelerating consolidation. Compaction and soil improvement. Computer-aided analysis and design. Laboratory and standard field testing. 3 lectures, 1 laboratory. Prerequisite: CE 381.

CE 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 16 units. Prerequisite: Sophomore standing and consent of instructor.

CE 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 16 units. Prerequisite: Sophomore standing and consent of instructor.

CE 500 Individual Study (1-3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

CE 521 Airfield and Highway Pavement Designs (4)

Theories, principles, and procedures in the structural design of highway and airfield pavements. Design of rigid and flexible pavements. Construction and maintenance procedures for pavements and stabilized bases. 3 lectures, 1 laboratory. Prerequisite: CE 221, CE 259, graduate standing or consent of instructor.

CE 522 Advanced Transportation Design (4)

Application of computers to advanced highway and transportation systems and geometrics. Use of computers for

the solution of transportation facility design problems. 2 lectures, 2 laboratories. Prerequisite: CE 221, graduate standing, or consent of instructor.

CE 523 Transportation Systems Planning (4)

Planning of urban and regional multimodal transportation systems. Selection of routes and types of systems based on economic, social, technological, and other characteristics. 2 lectures, 2 laboratories. Prerequisite: CE 221, graduate standing, or consent of instructor.

CE 525 Airport Planning and Design (4)

Historical background of aviation and airport development; financing; estimating demand; aircraft characteristics; airport capacity; airspace and air traffic control; site selection; airport configuration; geometric design of landing area; planning and development of terminal areas; lighting; pavement design and drainage. 3 lectures, 1 laboratory. Prerequisite: CE 221, graduate standing, or consent of instructor.

CE 527 Traffic Engineering—Operations and Controls (4)

Techniques for making traffic engineering investigations. Advanced traffic control concepts. Centralized versus decentralized systems. New technologies. IVHS. 3 lectures, 1 laboratory. Prerequisite: CE 421, graduate standing, or consent of instructor.

CE 528 Transportation Analysis (4)

Principles and applications of engineering systems analysis to transportation using examples from different modes. Identification of transportation benefits, costs, user and non-user impacts, vehicle operating characteristics, programming and scheduling. 3 lectures, 1 laboratory. Prerequisite: CE 221, ME 314, graduate standing, or consent of instructor.

CE 529 Modeling and Simulation in Transportation (4)

Theory and operation of transportation systems, the systems approach, simulation techniques. Use of available software packages. Simulation model development, calibration and use. 2 lectures, 2 laboratories. Prerequisite: CE 421, graduate standing, or consent of instructor.

CE 533 Advanced Water Resources Engineering (3)

Matrix and simulation methods in hydrology, statistical studies in hydrology and their applications to civil engineering problems. Generalized hydrologic characteristics. Hydrologic simulation, computer applications, urban and small watershed hydrology, macroscopic and microscopic approach. Storm water management models. Hydrologic design. 3 lectures. Prerequisite: CE 336 or graduate standing.

CE 554 Matrix Analysis of Structures (3)

Matrix terminology and operations. Matrix procedures for analysis of continuous beams, plane frames, and space frames under static and quasi-static loading. Stiffness and flexibility methods. Computer applications. Special techniques for larger systems. 3 lectures. Prerequisite: CE 352, CE 353, or graduate standing.

CE 555 Advanced Civil Engineering Materials Laboratory (2)

Fundamental properties of new and advanced materials. Experimental techniques. Fracture characteristics and

composite response of cement matrix composites. New materials and products to advanced applications such as automation. 2 laboratories. Prerequisite: CE 259 or graduate standing.

CE 558 Introduction to Finite Element Analysis (3)

Formulation of the finite element method. Finite elements and their properties. Analysis of plates, shells and framed structures under static and dynamic loads. Digital computer implementation of the finite element method. 3 lectures. Prerequisite: CE 554.

CE 559 Advanced Structural Design (3)

Advanced analysis, design and behavior of structural concrete. Reinforced, prestressed, and precast concrete elements. Linear and nonlinear structural systems. Origin of code requirements. Detailed design of components of civil engineering systems, for construction. Beams, slabs, columns, continuous systems, walls, connections, and composite systems. 3 lectures. Prerequisite: CE 355 or graduate standing.

CE 570 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 seminars. Prerequisite: Graduate standing or consent of instructor.

CE 571 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 laboratories. Prerequisite: Graduate standing or consent of instructor.

CE 573 Public Works Administration (3)

Management and engineering of transportation and related systems in public jurisdictions. Traffic systems, streets and highways, illumination, distribution systems, etc. Personnel management, financing, public relations, and contract management. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

CE 574 Computer Applications in Civil Engineering (3)

Overview of computer application, hardware and software alternatives, use of selected application programs, CAD, microcomputers, management and application of resources. 1 lecture, 2 laboratories. Prerequisite: Graduate standing or consent of instructor.

CE 581 Advanced Geotechnical Engineering (3)

Stress-strain-deformation response of soils under both drained and undrained loading. Computer-aided analysis using modern constitutive models. Conventional and advanced strength testing using the Bishop-Wesley Triaxial Cell and the Rowe Consolidometer. 1 lecture, 2 laboratories. Prerequisite: CE 481, graduate standing or consent of instructor.

CE 582 Advanced Geotechnical Testing (3)

Standard penetration, cone penetration, and flat-plate dilatometer testing. Equipment operation and maintenance. Interpretation of CPT/DMT sounding data. Stratigraphic analysis. CPT/DMT-based analysis and design of shallow and

deep foundations. 1 lecture, 2 laboratories. Prerequisite: CE 481, graduate standing or consent of instructor.

CE 583 Soil Dynamics (3)

Machine and earthquake-induced ground motion, wave propagation through soil. Behavior of soil and foundations under cyclic and dynamic loading. Evaluation of design loading and soil response parameters. Analysis of liquefaction potential. 3 lectures. Prerequisite: CE 481, graduate standing or consent of instructor.

CE 584 Lateral Support Systems (3)

Classical and modern earth pressure theories. Lateral earth pressure calculations for general surface and subsurface conditions. Analysis and design of cantilever reinforced concrete walls, cantilever and anchored sheetpile walls. Braced excavations, reinforced earth, and tie-back walls. 3 lectures. Prerequisite: CE 381, graduate standing or consent of instructor.

CE 585 Slope Stability Analysis (3)

Analysis of stability by planar, circular arc, piecewise-linear, and composite-surface techniques. Analysis of earth dams and reservoirs for both static and steady flow conditions. Stability under earthquake loading. Computer-aided analysis, field reconnaissance and slope stabilization techniques. 3 lectures. Prerequisite: CE 381, graduate standing or consent of instructor.

CE 587 Analysis and Design of Deep Foundations (3)

Bearing capacity analysis, settlement analysis. Design of single piles and pile groups for vertical, lateral, and combined loading. Analysis and design of drilled piers and caissons. 3 lectures. Prerequisite: CE 481, graduate standing or consent of instructor.

CE 591 Graduate Seminar (2)

Current trends and characteristics of civil engineering. Group discussions of skills, techniques and practices. Reports and discussions by students, based on topics of interest to individuals. 1 seminar, 1 laboratory. Prerequisite: Graduate standing in Civil/Environmental Engineering or consent of instructor.

CE 599 Design Project (Thesis) (2) (2) (5)

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis. Prerequisite: Graduate standing.

CHEM-CHEMISTRY

CHEM 106 Introductory Chemistry (3)

Introductory course in chemistry. Measurement, metric system, properties of matter, chemical symbols, atomic structure, chemical formulas, nomenclature, chemical equations, the mole concept, stoichiometry. Not open to students who have credit in a college chemistry course. 3 lectures.

CHEM 121 General Chemistry (4) GEB B.1.a.

Fundamental principles including atomic structure, bonding, nomenclature, chemical equations, states of matter, solutions, and energy with attention to applications to related

fields. Intended primarily for students whose majors are not in the Schools of Engineering or Science and Mathematics. Not open to students with credit for CHEM 124 or CHEM 127. 3 lectures, 1 laboratory. Prerequisite: CHEM 106 or equivalent or consent of instructor.

CHEM 122 General Chemistry (4) GEB B.1.a.

Continuation of CHEM 121. Colloids, kinetics, equilibrium, acids and bases, electrochemistry, nuclear chemistry, nonmetals, applications to related fields. Intended primarily for students whose majors are not in the Schools of Engineering or Science and Mathematics. Not open to students with credit for CHEM 125 or CHEM 128. 3 lectures, 1 laboratory. Prerequisite: CHEM 121.

CHEM 124 General Chemistry (4) GEB B.1.a.

Atomic structure, chemical equations, stoichiometry (mass balance in chemical reactions), naming of simple inorganic compounds, solutions. Introduction to carbon compounds emphasizing fuels and polymers. Intended primarily for engineering majors, except Engineering Technology and Industrial Technology. Not open to students with credit for CHEM 121 or CHEM 127. 3 lectures, 1 laboratory. Prerequisite: CHEM 106 or equivalent or consent of instructor.

CHEM 125 General Chemistry (4) GEB B.1.a.

Introduction to chemical thermodynamics (energy balance in chemical reactions), equilibrium, rates of reaction, acids and bases, coordination compounds, oxidation-reduction reactions, electrochemistry, corrosion, nuclear chemistry. Intended primarily for students whose majors are in the School of Engineering. Not open to students with credit for CHEM 122 or CHEM 128. 3 lectures, 1 laboratory. Prerequisite: CHEM 124.

CHEM 127 General Chemistry (4) GEB B.1.a.

Introduction to atomic theory, chemical reactions, bonding, stoichiometry, nomenclature, gas laws, colligative properties, colloids, and solutions. Intended primarily for students whose majors are in the School of Science and Mathematics. Not open to students with credit in CHEM 121 or CHEM 124. 3 lectures, 1 laboratory. Prerequisite: High school algebra and chemistry or CHEM 106.

CHEM 128 General Chemistry (4) GEB B.1.a.

Continuation of CHEM 127. Oxidation-reduction reactions, electrochemistry, kinetics, equilibria, thermodynamics, acids and bases. Intended primarily for students whose majors are in the School of Science and Mathematics. Not open to students with credit in CHEM 122 or CHEM 125. 3 lectures, 1 laboratory. Prerequisite: CHEM 127.

CHEM 129 General Chemistry (4) GEB B.1.a.

Acid and base equilibria, buffers, transition elements, solubility, complex ions, hybridization, nuclear chemistry. Laboratory study of the chemical properties and semi-micro qualitative analysis of the representative group elements of the periodic table. Intended primarily for students whose majors are in the School of Science and Mathematics. 3 lectures, 1 laboratory. Prerequisite: CHEM 125 or CHEM 128.

CHEM 156 General Chemistry Laboratory (1) GEB B.1.a.

Additional laboratory to be taken with CHEM 129. Includes chemical properties and semi-micro qualitative analysis of the transition and post-transition metal ions of the periodic table, methods of inorganic synthesis. 1 laboratory. Prerequisite: CHEM 122, CHEM 125, or CHEM 128.

CHEM 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: CHEM 121, CHEM 124, or CHEM 127 and consent of department head.

CHEM 252 Laboratory Glassblowing (1)

Techniques of glassblowing applied to the making of simple laboratory apparatus. 1 laboratory. Prerequisite: CHEM 121, CHEM 124 or CHEM 127.

CHEM 253 Chemical Literature (2)

Information searches in primary and secondary chemical literature and computer database. Organizing and presenting chemical information in written documents. 1 lecture, 1 activity. Prerequisite: CHEM 316 or CHEM 326.

CHEM 301 Biophysical Chemistry (3) GEB B.1.a.

Basic physical chemistry for the study of biological systems. Kinetic-molecular theory, gas laws, principles of thermodynamics as applied to biochemical systems. Not open to students with credit in CHEM 305. 3 lectures. Prerequisite: CHEM 328 or concurrent CHEM 371, PHYS 123 or PHYS 133, MATH 132 or MATH 142.

CHEM 302 Biophysical Chemistry (4) GEB B.1.a.

Application of physical chemistry to biochemical systems. Buffers, electrochemistry, reaction rate theory, enzyme kinetics, viscosity, surface and transport properties of macromolecules. Not open to students with credit in CHEM 306. 3 lectures, 1 laboratory. Prerequisite: CHEM 301 or CHEM 305; CHEM 328 or CHEM 371; CHEM 331.

CHEM 305 Physical Chemistry (3) GEB B.1.a.

Introduction to chemical thermodynamics. Thermochemistry. Phase equilibria. Chemical equilibrium. 3 lectures. Prerequisite: PHYS 123 or PHYS 133, CHEM 125 or CHEM 129, MATH 132 or MATH 142.

CHEM 306 Physical Chemistry (3) GEB B.1.a.

Applications of chemical thermodynamics. Electrochemistry. Kinetic theory of gases. Chemical kinetics. 3 lectures. Prerequisite: CHEM 305.

CHEM 307 Physical Chemistry (4) GEB B.1.a.

Introduction to quantum theory. Chemical bonding and molecular structure. Spectroscopy and diffraction. 3 lectures, 1 laboratory. Prerequisite: CHEM 302 or CHEM 306 and CHEM 356, or consent of instructor.

CHEM 316 Organic Chemistry (4) GEB B.1.a.

Structure, bonding, nomenclature, isomerism, stereochemistry and physical properties of organic compounds. Reactions and mechanisms of alkanes, alkenes, alkynes, cycloalkanes. Laboratory techniques in organic preparations. 3 lectures, 1 laboratory. Prerequisite: CHEM 122, CHEM 125 or CHEM 129.

CHEM 317 Organic Chemistry (5) GEB B.1.a.

Reactions and reaction mechanisms of organic halides, alcohols, phenols, epoxides, ethers, carboxylic acids and their derivatives, aldehydes, ketones; acidity and basicity; infrared and NMR spectroscopy. 3 lectures, 2 laboratories. Prerequisite: CHEM 316.

CHEM 318 Organic Chemistry (5) GEB B.1.a.

Chemistry of amines, aromatic compounds, heterocycles, macromolecules, some biomolecules, carbanions, rearrangements; mass spectrometry. Practice in organic synthesis. 3 lectures, 2 laboratories. Prerequisite: CHEM 317.

CHEM 326 Survey of Organic Chemistry (4) GEB B.1.a.

Structure, nomenclature, some characteristic reactions of functional groups and applications of organic chemicals in agriculture, medicine, industry and the home. A terminal survey course not open to students with credit in CHEM 316. 3 lectures, 1 laboratory. Prerequisite: CHEM 122, CHEM 125 or CHEM 128.

CHEM 328 Survey of Biochemistry (4) GEB B.1.a.

Fundamental chemistry of carbohydrates, proteins, fats, vitamins, enzymes and hormones as applied to their function in plant and animal metabolism. Special reference to the application of chemistry to the areas of agriculture, human health and nutrition, and the production of food and animal feeds. 3 lectures, 1 laboratory. Prerequisite: CHEM 326.

CHEM 331 Quantitative Analysis I (5) GEB B.1.a.

Introduction to the principles of analytical chemistry. Sampling, interpretation of data, and the application of chemical equilibria to analytical problems. Survey of important analytical methods emphasizing the theory and implementation of titrimetric methods. 3 lectures, 2 laboratories. Prerequisite: CHEM 129.

CHEM 332 Quantitative Analysis II (3) GEB B.1.a.

Theory and analytical techniques associated with gravimetric analysis and titrimetric precipitometry. Continuation of redoximetry. Introduction to instrumental methods of analysis, with theory and application of electrogravimetry, potentiometry and spectrophotometry. 2 lectures, 1 laboratory. Prerequisite: CHEM 331.

CHEM 335 Clinical Chemistry (3) GEB B.1.a.

Basic principles of physiological chemistry including clinical significance of medical laboratory data. Introduction to medical laboratory techniques used in the quantitative determination of glucose, protein, hemoglobin and lipids in biological fluids including blood, serum, and urine. 2 lectures, 1 laboratory. Prerequisite: CHEM 328 or CHEM 371, and CHEM 331.

CHEM 336 Clinical Chemistry (4) GEB B.1.a.

Advanced principles of physiological chemistry including clinical significance of medical laboratory data. Theoretical and practical aspects of diagnostic enzymology and biochemical profiling. Medical laboratory techniques used in the determination of renal and liver function, electrolytes, enzymes, hormones, and toxic substances. 3 lectures, 1 laboratory. Prerequisite: CHEM 335 or CHEM 372 or permission of instructor.

CHEM 341 Environmental Chemistry: Water Pollution (3)**GEB B.1.a.**

Chemical aspects of water and water pollution: alkalinity; acid deposition, particularly relating to lake and stream acidification and forest decline; drinking water treatment and THMs; wastewater treatment; detergents, builders, and eutrophication; pesticides; other toxic organic compounds such as PCBs and dioxin; hazardous wastes; toxic elements such as Pb, Hg, Sn, Cd, and Se. 3 lectures. Prerequisite: CHEM 129 and CHEM 326 or CHEM 316.

CHEM 342 Environmental Chemistry: Air Pollution (3)**GEB B.1.a.**

Chemical aspects of the atmosphere and air pollution: greenhouse effect and global climate change; CFCs, the ozone layer, and the ozone hole; carbon monoxide, nitrogen oxides, and photochemical smog, particulate matter; radon, asbestos, indoor air pollution; sulfur oxides and acid deposition, particularly relating to atmospheric reactions and control options. 3 lectures. Prerequisite: CHEM 129 and CHEM 326 or CHEM 316.

CHEM 344 Chemical Process Principles (3)**GEB B.1.a.**

Fundamental terms, concepts, and principles used in the chemical processing industries. 3 lectures. Prerequisite: CHEM 316 or consent of instructor.

CHEM 350 Chemical Safety (1)

Laboratory regulations, equipment hazard analysis, hazardous chemicals, classification of chemicals, toxic materials handling, reaction hazards, radiation, emergency procedures, safety management programs and legal concerns. Includes project. 1 lecture. Prerequisite: CHEM 326 or equivalent.

CHEM 355 Physical Chemistry Laboratory (1)**GEB B.1.a.**

Experimental studies of gases, solutions, thermochemistry and chemical equilibria. 1 laboratory. Corequisite: CHEM 305. Prerequisite: CHEM 331.

CHEM 356 Physical Chemistry Laboratory (1)**GEB B.1.a.**

Experimental studies of phase rule, electrochemistry and chemical kinetics. 1 laboratory. Corequisite: CHEM 306. Prerequisite: CHEM 331.

CHEM 371 Biochemical Principles (4)**GEB B.1.a.**

Chemical and physical factors in biological processes. Chemistry and function of major cellular constituents: proteins, nucleic acids, lipids, carbohydrates, vitamins. 3 lectures, 1 laboratory. Prerequisite: CHEM 326 or CHEM 317. Strongly recommended: CHEM 331.

CHEM 372 Metabolism (3)**GEB B.1.a.**

Intermediary metabolism, regulation and integration of metabolic pathways, bioenergetics, photosynthesis, electron transport, nitrogen fixation, biochemical function of vitamins and minerals. 3 lectures. Prerequisite: CHEM 371.

CHEM 373 Molecular Biology (3)**GEB B.1.a.**

Synthesis, conformation and structure of biopolymers: nucleic acids and proteins. Function of macromolecular complexes: cell walls, ribosomes, membranes, and others. Biochemical genetics, cell differentiation and regulation,

viruses and biochemical evolution. 3 lectures. Prerequisite: CHEM 371.

CHEM 374 Biochemistry Laboratory (2)**GEB B.1.a.**

Experiments in metabolism, including animal and microbial studies; isolation and characterization of enzymes and nucleic acids. 2 laboratories, offered during the same day or on consecutive days to simulate biochemical research conditions. Prerequisite: CHEM 371.

CHEM 375 Molecular Biology Laboratory (2)**(Also listed as BIO 375)****GEB B.1.a.**

Introduction to techniques used in molecular biology and biotechnology; plasmid DNA extraction, agarose gel electrophoresis, restriction endonuclease mapping, transduction, transformation, and gene cloning. 2 laboratories. Prerequisite: BACT 221 or BACT 224 and BIO 304 or CHEM 373.

CHEM 377 Chemistry of Drugs and Poisons (3)**GEB B.1.a.**

Introduction to pharmacology: history, sources, development and testing, physical and chemical properties, biochemical and physiological effects, mechanisms of action, and the therapeutic uses and toxicology of common drugs and poisons acting on the nervous, cardiovascular, immune and hormone systems, and on cancer, infectious disease, etc. Especially applicable to students in nonbiochemical disciplines. 3 lectures. Prerequisite: CHEM 328 or CHEM 371 or consent of instructor.

CHEM 385 Geochemistry (3)**GEB B.1.a.**

Application of chemical principles to terrestrial and extraterrestrial systems. Formation of the elements; chemical influences on the earth's formation; chemical evolution studies; age-dating techniques; reactions in sea water; petroleum and ore formation; distribution and movement of the elements. 3 lectures. Prerequisite: CHEM 316, CHEM 331.

CHEM 400 Special Problems for Advanced Undergraduates (1-3)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 3 units per quarter. Prerequisite: Junior standing and consent of department head.

CHEM 419 Bioorganic Chemistry (3)

Methods of investigating reaction mechanisms, mechanisms of chemical catalysis, organic models of enzymes, chemistry of vitamins that serve as enzyme cofactors, chemistry of the phosphate group, synthesis of biomolecules. 3 lectures. Prerequisite: CHEM 318.

CHEM 420 Advanced Organic Chemistry-Synthesis (3)

Modern methods of organic synthesis. Carbon-carbon bond forming reactions, functional group transformations, protecting groups, strategies of total synthesis of natural products. 3 seminars. Prerequisite: CHEM 318.

CHEM 435 Food Analysis (4)

Techniques used commercially in the chemical analysis of seed and cereal crops, fruit and vegetable crops, forage crops, meat and meat products, milk and dairy products, eggs and poultry products. Vitamin determinations,

microbiological assay, quality control, taste testing, legal specifications, grading and labeling. 3 lectures, 1 laboratory. Prerequisite: CHEM 328 or CHEM 371.

CHEM 436 Agricultural Chemicals (4)

Chemistry of fungicides, insecticides, rodenticides, plant growth regulators, soil conditioners, and fertilizers. Special reference to the analysis, manufacture, toxicology, legal specification, and regulations. 3 lectures, 1 laboratory. Prerequisite: CHEM 328 or CHEM 371.

CHEM 439 Instrumental Analysis (5)

Theory, practice and method selection of modern instrumental analytical techniques, including spectroscopic, electrochemical, chromatographic and thermal methods. Current industrial applications. Laboratory work emphasizes optimization of experimental parameters. 3 lectures, 2 laboratories. Prerequisite: CHEM 331, CHEM 356 or CHEM 302. Recommended: CHEM 307.

CHEM 444 Polymers and Coatings I (3)

Physical properties of polymers and coatings and their measurement. Molecular weight averages, glass transition, thermodynamics of polymers. Viscoelastic properties, rheology, molecular weight determination. Thermal analysis, spectroscopic analysis, mechanical testing. 3 lectures. Prerequisite: CHEM 317.

CHEM 445 Polymers and Coatings II (3)

Introduction to polymerization methods and mechanisms. Chemistry of initiators, catalysts and inhibitors. Uses of representative polymer types. Synthesis, film formation, structure and properties of polymers commonly used in coatings and adhesives. 3 lectures. Prerequisite: CHEM 317.

CHEM 446 Surface Chemistry of Materials (3) (Also listed as MATE 446)

Surface energy. Capillarity, solid and liquid interface, adsorption. Surface areas of solids. Contact angles and wetting. Friction, lubrication and adhesion. Relationship of surface to bulk properties of materials. Applications. 3 lectures. Prerequisite: CHEM 306.

CHEM 447 Polymers and Coatings Laboratory I (2)

Synthesis and characterization of polymers. Experimental techniques of step growth and chain growth polymerization. Experimental methods of molecular weight determination. Experimental methods of thermal, spectroscopic, and mechanical analysis. 2 laboratories. Prerequisite: CHEM 444. Recommended: CHEM 445 or concurrent.

CHEM 448 Polymers and Coatings Laboratory II (2)

Experimental techniques of producing and characterizing coatings. Compounding and formulating modern protective coatings. Modern methods of testing protective coatings. Surface preparation techniques. 2 laboratories. Prerequisite: CHEM 446, CHEM 447.

CHEM 449 Internship in Polymers and Coatings (2)

Selected students will spend up to 12 weeks with an approved polymers and coatings firm engaged in production or related business. Time will be spent applying and developing production and technical skills and abilities in the

polymers and coatings industry. Prerequisite: CHEM 317 or consent of instructor.

CHEM 450 Chemical Warfare (2)

History, development, and use of chemical weapons. Chemical disarmament. Production and destruction of modern agents. Use of chemical agents in Southeast Asia and Middle East. Ethics of chemical warfare. 2 seminars. Prerequisite: CHEM 326 or CHEM 316.

CHEM 455 FT-NMR Laboratory (1) (CR/NC)

Basic theory and operation of the high-field Fourier transform nuclear magnetic resonance spectrometer. Credit/No Credit grading only. 1 laboratory. Prerequisite: CHEM 318.

CHEM 457 Qualitative Organic Analysis (3)

Experimental determination of the identity of organic compounds. Emphasis on chemical methods. 1 lecture, 2 laboratories. Prerequisite: CHEM 317.

CHEM 458 Instrumental Organic Qualitative Analysis (3)

Separation, purification, and identification of organic molecules using chemical and instrumental methods, including nuclear magnetic resonance, infrared and ultraviolet spectroscopy and mass spectroscopy, and techniques in high resolution FT-NMR. 1 lecture, 2 laboratories. Prerequisite: CHEM 318.

CHEM 459 Undergraduate Seminar (2)

Oral presentation of current developments in chemistry based on current literature. Preparation for employment and for independent work in chemistry. 2 seminars. Prerequisite or corequisite: CHEM 253 and junior standing.

CHEM 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: CHEM 459.

CHEM 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: CHEM 301, or CHEM 305, or CHEM 317 or consent of instructor.

CHEM 471 Selected Advanced Laboratory (1-3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor.

CHEM 473 Immunochemistry (3)

Theory and practice of immunochemistry including the structure, genetics, chemical modification and production of antibodies, immunochemical techniques and the biochemistry of the immune defense process. 3 lectures. Prerequisite: CHEM 371 or consent of instructor.

CHEM 474 Protein Techniques Laboratory (2)

Experiments in protein affinity chromatography, electrophoresis and blotting, immunoprecipitation

techniques, antibody-enzyme conjugation, and immunoassay. 2 laboratories. Prerequisite: CHEM 473 or ZOO 426.

CHEM 475 Tissue Culture Techniques (4) (Also listed as BIO 475)

Introduction to the principles and methods of tissue culture with emphasis on the manipulation and study of animal cells. 2 lectures, 2 laboratories. Prerequisite: BACT 221 or BACT 224, BIO 303 and CHEM 328 or CHEM 371.

CHEM 477 Biochemical Pharmacology (3)

Consideration of current selected topics in pharmacology including drug design, biochemical mechanisms of drug activity and issues pertaining to the disposition of drugs to the public. Lecture, professional consultation, library research, and student presentations. 3 lectures. Prerequisite: CHEM 377 or equivalent as determined by instructor.

CHEM 481 Inorganic Chemistry (3)

A systematic study of chemical and physical properties of inorganic compounds based on periodic groupings with emphasis on chemical bonding and structure. Topics will include coordination chemistry and kinetics, organometallic chemistry, advanced acid-base relationships and bonding theories plus other selected topics. 3 lectures. Prerequisite: CHEM 306 and CHEM 331 or consent of instructor.

CHEM 483 Inorganic Synthesis (1)

Synthetic methods involving the preparation and characterization of a variety of inorganic, organometallic and coordination compounds employing high temperature, inert atmosphere, photolytic, electrolytic and other synthetic techniques. 1 laboratory. Prerequisite or concurrent: CHEM 481.

CHEM 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. 2 units only applicable to approved chemistry electives. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

CHEM 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. 2 units only applicable to approved chemistry electives. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

CHEM 528 Nutritional Biochemistry (3)

Nutritional aspects of biochemistry. Lecture, library research and student presentations. Topics include vitamins and minerals, essential and energy providing nutrients, deficiency, degenerative and genetic diseases of metabolism. Emphasis on current research and controversy. 3 lectures.

Prerequisite: CHEM 328 or CHEM 372 or consent of instructor.

CM-CONSTRUCTION MANAGEMENT

CM 321 Concrete Technology (3)

Modern concepts which form the basis for solutions to problems of concrete construction. Includes significant developments in concrete chemistry and strength theory. Concrete mix design, physical properties of concrete, use of admixtures, concrete batching, curing and testing. Includes physical testing of designed mixes. 2 lectures, 1 laboratory. Prerequisite: Third-year standing.

CM 325 Construction Management Practices (3)

Overview of construction methods, building systems, construction and contract documents, cost estimating and scheduling and other practices used in the contracting process. For non-majors. 2 lectures, 1 activity. Prerequisite: Second-year standing or consent of instructor.

CM 331 Construction Cost Control (3)

Basic application of construction cost control systems and the use of cost information and associated reports. 3 lectures. Prerequisite: ACTG 211 and third-year standing or consent of instructor.

CM 332 Cost Alternatives Evaluation (4)

Basic principles of economic evaluations between cost alternatives. 4 lectures. Prerequisite: ECON 211 or ECON 222 and third-year standing or consent of instructor.

CM 333 Construction Contracts Administration (3)

Administration of construction documents including invitation to bid, addenda, proposals, change orders, subcontracts, liens, claims, waivers, and arbitration. 3 lectures. Prerequisite: BUS 201 and third-year standing or consent of instructor.

CM 341 Residential and Light Commercial Construction Practices (3)

Building systems, equipment, materials, and techniques. Construction practices related to residential and light commercial structures. One designated field trip required. 3 laboratories. Prerequisite: Third-year standing.

CM 342 Commercial, Institutional and Industrial Construction Practices (3)

Building systems, equipment, materials, and techniques. Construction practices related to large commercial, institutional and industrial structures. One designated field trip required. 3 laboratories. Prerequisite: Third-year standing.

CM 343 Earthwork and Civil Works Construction Practices (3)

Earthwork and civil works construction methods, stressing field operations management, engineering estimating. 3 laboratories. Prerequisite: Third-year standing.

CM 350 Computer Applications in Construction Management (2)

Application of computer systems to control construction operations in the building industry. Development of

construction management games. 2 lectures. Prerequisite: CSC 110 or ARCH 250.

CM 352 Building Support System Construction Practices (5)

Equipment, materials and techniques of installation and construction of underground utilities and electrical power systems. Includes water supply and collection, electrical and gas distribution. Communications, CATV and conveyance systems. Emphasis on the role of specialty contractors in the construction process. 5 activities. Prerequisite: Third-year standing.

CM 353 Building Support System Construction Practices (5)

Equipment, materials and techniques of installation and construction of environmental systems. Includes commercial and industrial piping, environmental systems controls, and conveyances. Emphasis on the role of specialty contractors in the construction process. 5 activities. Prerequisite: Third-year standing.

CM 364 Project Administration (3)

Management activities applicable to the construction project involving techniques, applications, and theory needed in a changing environment. An interdisciplinary approach addressing the relationship and roles of the project team of the constructor, architect, engineers and owner. 3 activities. Prerequisite: Third-year standing.

CM 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

CM 412 Survey of Building Codes and Regulations (2)

Building codes and legal problems related to the construction industry. Contractor's licensing laws, labor and lien laws. 2 lectures. Prerequisite: Fourth-year standing.

CM 431 Management of Interdisciplinary Functions in Construction (3)

Management activities applicable to the building process including conceptual, planning, design, bid, negotiation, construction, and occupancy phases of public and private projects. Emphasis on the integration of planning, design and construction efforts to achieve maximum project quality and value. 3 lectures. Prerequisite: Upper division standing.

CM 433 Economic Analysis for Engineers (2)

Engineering economics, and engineering studies including feasibility and alternate problem analysis. 2 lectures.

CM 443 Principles of Construction Management (3)

Applications of a broad range of construction management techniques to case studies involving a variety of operations in construction firms. 3 activities. Prerequisite: Fourth-year standing or consent of instructor.

CM 444 Concrete Formwork and Temporary Structures (3)

Methods and techniques used in the design and construction of concrete formwork, temporary earth retaining systems, and

other temporary construction structures. 3 activities. Prerequisite: Fourth-year standing or consent of instructor.

CM 445 Heavy Construction Methods and Techniques (2)

Methods and procedures; field operations for heavy construction projects. 2 activities. Prerequisite: Fourth-year standing or consent of instructor.

CM 452 Project Controls (4)

Planning, organization, scheduling, and control of construction projects. 4 laboratories. Prerequisite: Fourth-year standing or consent of instructor.

CM 453 Project Development (4)

Methods and procedures used in the development of a residential, commercial, or industrial project. 4 laboratories. Prerequisite: Fourth-year standing, CRP 212, LA 212 or consent of instructor.

CM 454 Building Estimating (4)

Procedures for determining quantities of materials and estimating costs for construction projects. 4 laboratories. Prerequisite: Fourth-year standing or consent of instructor.

CM 461, 462 Senior Project (2) (1) (CR/NC)

Selection and completion of a comprehensive project under faculty supervision. Problems to involve the student's technical and creative skills. Construction and team projects encouraged. To be completed in two consecutive quarters. 90 hours minimum total time. Credit/No Credit grading only. Prerequisite: CM 341, CM 342, CM 343.

CM 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. Miscellaneous course fee required—see *Class Schedule*. 1 to 3 lectures. Prerequisite: Consent of instructor.

CM 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 laboratories. Prerequisite: Consent of instructor.

CM 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

CM 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

CM 531 Construction Cost and Material Control (3)

Advanced theory and practice of cost and material control for construction projects. Emphasis on computer applications. 2 lectures, 1 activity. Prerequisite: CM 331 or consent of instructor.

CM 533 Case Histories in Contract Administration (3)

Common points of disputes between design professional, owner, and contractor. Methods of avoidance and dispute resolution. 3 activities. Prerequisite: CM 333, 4th year architectural practice or consent of instructor.

CM 542 Construction Estimating and Bidding Strategy (3)

Advanced theory and practice of cost estimating techniques. Includes standard, conceptual and parameter estimating; risk analysis. Emphasis on computer applications. 2 lectures, 1 activity. Prerequisite: CM 420 or consent of instructor.

CM 552 Construction Project Scheduling (3)

Basic and advanced network scheduling techniques as applied to architectural building projects. Emphasis on computer applications. 2 lectures, 1 activity. Prerequisite: CM 542 or consent of instructor.

CM 570 Selected Advanced Topics in Construction Management (3)

Directed study of selected topics in Construction Management. *Class Schedule* will list topic selected. Total credit limited to 9 units. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

CONS-CONSERVATION**CONS 120 Fisheries and Wildlife Management (3)**

Survey of fisheries and wildlife resources and management practices. Relationships to recreational values, land management, food production, and preservation. 3 lectures.

CONS 207 Resource Survey (3)

Introduction to survey and analysis methods used in assessing biological resources. Inventory methods of vegetation and wildlife sampling and questionnaire surveys. 2 lectures, 1 laboratory.

CONS 210 Biology and Conservation of Endangered Species (3)

Importance of species diversity. Past and present causes of endangerment and extinction. Biological attributes which predispose species to extinction. Modern recovery efforts, including habitat preservation and captive propagation. Emphasis on North American plants and animals. 3 lectures. Prerequisite: One course in Biological Sciences.

CONS 221 Wildlife Techniques (3)

Techniques for terrestrial wildlife investigations. Field and lab procedures including telemetry, marking, capture, age and sex determination, and population analysis. 2 lectures, 1 laboratory. Prerequisite: CONS 120.

CONS 311 Introductory Conservation (3)

Basic principles and problems of conservation. Interrelationships of living organisms and their biotic and abiotic environments. Regional and global perspectives on manipulations and alterations in marine, freshwater and

terrestrial ecosystems. 3 lectures. Prerequisite: One course in Biological Sciences.

CONS 320 Fishery Resource Management (4)

Management of recreational and commercial fisheries to produce sustained annual crops of fishes. Survey, inventory, and evaluation techniques used for the management of a fishery. Methods of dealing with fish populations, aquatic habitats, and user groups. 3 lectures, 1 laboratory. Prerequisite: BIO 325 or consent of instructor.

CONS 422 Freshwater Fisheries (4)

Biological, geographical, historical, political and economic aspects of freshwater fishes, fishery resources, and fresh waters of the Pacific Coast. Identification, life history, distribution and ecology of important western and local species. Field trips to water projects, warm and cold water fishery facilities, major aquarium. 3 lectures, 1 laboratory. Prerequisite: ZOO 322.

CONS 426 Population Dynamics (3)

Growth, fluctuations, balance, and natural mechanisms controlling terrestrial wildlife populations. 3 lectures. Prerequisite: BIO 325 or one course in ecology.

CONS 427 Habitat Management (4)

Habitat design, development, and management of wetlands and uplands that support wildlife. Habitat development planning project required. 3 lectures, 1 laboratory. Some weekend labs necessary. Prerequisite: BIO 325 or consent of instructor.

CONS 431 Game Management (4)

General principles, problems and techniques of increasing the harvest of waterfowl, upland game, and big game. Identification and life histories of important western game species. Several weekend field trips. 3 lectures, 1 laboratory. Prerequisite: BIO 325 or ASCI 229.

CONS 433 Aquaculture (4)

Propagation and rearing of fishes, invertebrates and algae from marine and freshwater habitats. Current methodologies and general life histories. Global perspective with focus on aquacultural development in developed and undeveloped countries. 3 lectures, 1 laboratory. Prerequisite: BIO 152, ZOO 336 or consent of instructor.

CPE-COMPUTER ENGINEERING**CPE 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of CPE Director.

CPE 215 Computer Architecture I (4) (Also listed as CSC 215)

Assembly level computer organization. Basic machine representation of numeric and non-numeric data. Assembly level instruction sets, their corresponding addressing modes, and the underlying computer architecture. Introduction to algorithmic problem solving and program design in assembly language. Intended for CPE and CSC majors. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1

laboratory. Prerequisite: CPE 219 (or concurrent enrollment) and CSC 218.

CPE 219 Logic and Switching Circuits (3) (Also listed as EE 219)

Modulo-N arithmetic and digital coding techniques. Fundamentals of Boolean algebra and minimization techniques. Multiple function synthesis using ROM's and PLA's. Combinational circuit design as it applies to computers. Sequential circuit elements, flip-flops, counters and shift-registers. 3 lectures. Prerequisite: CSC 118 or CSC 204.

CPE 259 Logic and Switching Circuits Laboratory (1) (Also listed as EE 259)

Laboratory synthesis of combinational and sequential logic circuits. Introduction to laboratory equipment such as digital oscilloscopes and logic state analyzers. Use of software (both off-the-shelf and customized) for logic simulation. Introduction to switch bouncing, hazards, and other logic faults. 1 laboratory. Concurrent: CPE 219.

CPE 315 Computer Architecture II (4)

Intermediate architecture topics: levels of virtual machines and their languages, with special emphasis on level 1 and microprogramming; design of conventional machines; study of tradeoffs in various designs. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CPE 215, CPE 219, and CSC 345.

CPE 316 Computer Architecture III (4)

Microprocessor architecture and interfacing. Emphasis on study of one microprocessor and how it interfaces with other logical components of a computer system. Serial and parallel I/O, static and dynamic RAM, ROM, DMA and Disk Controllers. 3 lectures, 1 laboratory. Prerequisite: CPE 315.

CPE 319 Digital System Design (3) (Also listed as EE 319)

Introduction to finite automata theory and the design of digital systems utilizing state-machines; analysis and synthesis of state-machines. Design of synchronous, asynchronous, and pulse mode sequential circuits. Role of the microprocessor in implementing state-machines. Trade-offs between system design utilizing hardware, firmware and microprocessors. 3 lectures. Prerequisite: CPE 219, EE 307.

CPE 353 Computer Systems Programming (3)

Design of assemblers, macroprocessors, linkers and loaders. Advanced macrowriting, I/O programming, and interrupt handlers. 3 lectures. Prerequisite: CPE 215, CSC 240, CSC 345.

CPE 359 Digital System Design Laboratory (1) (Also listed as EE 359)

Laboratory synthesis of combination and sequential logic circuits. Sequential subsystems analysis with the logic state analyzer. Fault testing and automated checkout procedures. Familiarization with the characteristics of SSI and MSI logic components. 1 laboratory. Prerequisite: CPE 259, EE 347. Concurrent or prerequisite: CPE 319.

CPE 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a

maximum of 2 units per quarter. Prerequisite: Consent of CPE coordinator.

CPE 404 Computer Networks (4) (Also listed as CSC 404)

Communications architectures and distributed systems; multicomputer complexes and interprocessor communications; communications media, message switching, and communications protocol standards. 3 lectures, 1 laboratory. Prerequisite: CSC 304, CSC 453, or consent of instructor.

CPE 405 Computer Networks II (4) (Also listed as CSC 405)

Network architectures and protocols; network performance analysis; the theory of error detection and correction; other advanced topics such as routing, network management, integrated services, satellite networks, fiber optics. 3 lectures, 1 laboratory. Prerequisite: CPE 404 or consent of instructor.

CPE 406 Microprocessor System Design Methodologies (3)

Classification and functional configurations of existing microprocessors and analysis of hardware system designs and system economics. Interface design techniques utilizing programmable I/O interfaces, real-time clocks, interrupts, and DMA channels. Representative applications. 3 lectures. Prerequisite: CPE 215, CPE 319, or consent of instructor. Concurrent: CPE 446.

CPE 407 Digital Computer Subsystems (3)

Design of registers, counters, sequencers, encoders, decoders, memories, and other computer subsystems. Use of modern techniques and devices in implementation. Consideration given to cost, speed, and dependability. 3 lectures. Prerequisite: CPE 319.

CPE 408 Digital Computer Systems (3)

Design of computer ALU's, microprogram controllers, memory systems, and I/O controllers. Use of LSI components in CPU design. Microprogram and nanoprogram development. 3 lectures. Prerequisite: CPE 407 or consent of instructor.

CPE 409 Computer Peripheral Interfacing (3)

Design of the more common computer peripherals (paper devices, floppy disks, etc.) with the emphasis on the controller and interfacing aspects. Use of microprocessors and/or LSI controller chips in the design of intelligent peripherals. 3 lectures. Prerequisite: CPE 406, or consent of instructor.

CPE 410 Performance Analysis (4)

Statistical and mathematical techniques for modeling and analyzing the performance of computer and communication systems. Tools and techniques for measuring performance of operational systems. Theory and methodologies for the design, procurement and evaluation of systems. Introduction to elementary concepts of discrete event simulation. 3 lectures, 1 laboratory. Prerequisite: STAT 321 or consent of instructor.

CPE 415 Microcomputer Systems (4)

Recent advances in microcomputer architectures. RISC, parallel processing advances, and component

communication. 3 lectures, 1 laboratory. Prerequisite: CPE 316.

CPE 446 Microprocessor Interfacing Laboratory (1)

Design and construction of selected digital systems. Utilization of superstrip boards to construct MSI, LSI based logic circuits. Interfacing of student-built systems with several representative microprocessors. Hardware/software performance evaluation of microprocessor interfacing techniques. 1 laboratory. Prerequisite: Consent of instructor. Concurrent: CPE 406.

CPE 448 Digital Computer Systems Laboratory (1)

Laboratory analysis and synthesis of digital computer subsystems. Microprogramming of a simple digital computer via computer simulation. Interfacing with digital systems. 1 laboratory. Prerequisite: CPE 359, and CPE 407 or CPE 409 or consent of instructor.

CPE 461, 462 Senior Project (3) (2)

Selection and completion of a project under faculty supervision. Project results are presented in a formal report. Miscellaneous course fee required—see *Class Schedule*. Minimum 150 hours total time. Prerequisite: CSC 315, EL 319.

CPE 463 Undergraduate Seminar (1) (CR/NC)

Discussion of new developments in the field of computer engineering. Fields of employment and job considerations. Credit/No Credit grading only. 1 seminar. Prerequisite: Senior standing.

CPE 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

CPE 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 16 units. Prerequisite: Sophomore standing and consent of instructor.

CPE 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 16 units. Prerequisite: Sophomore standing and consent of instructor.

CRP—CITY AND REGIONAL PLANNING

CRP 101 Introduction to the Profession of City and Regional Planning (1) (CR/NC)

Orientation to the jobs and responsibilities of professional planners working in the public and private sectors. Credit/No Credit grading only. 1 lecture.

CRP 111 Introduction to Drawing and Perspective (3)

Basic techniques used in graphic communication for planning. Orthographic and isometric projection. Mechanical perspective, shades and shadows. 3 laboratories.

CRP 112 Basic Graphics (3)

Drawing as a communication tool in planning. Exercises to develop basic skills and speed in the representation of ideas. Use of various drawing media. 3 laboratories. Prerequisite: CRP 111.

CRP 201, 202 Environmental Design Fundamentals (3) (3)

Elements of visual perception. Theories of environmental design. Program development. Analytic techniques and problem solving methodologies. Behavioral and social implications of environmental design decisions. Projects in the planning context. 3 laboratories. Prerequisite: CRP 111, CRP 112.

CRP 203 Applied Design and Planning Fundamentals (3)

Applications of basic design fundamentals and the design of environments through design exercises applied to planning. Miscellaneous course fee required—see *Class Schedule*. 3 laboratories. Prerequisite: CRP 202, LA 213.

CRP 211 Introduction to Urbanization (3) GEB F.2.

Evolution, planning, and design of cities in different cultures and eras. Interpretation of environmental, social, economic, and technological factors that have influenced the physical organization, planning, and design of cities. 3 lectures.

CRP 212 Introduction to Urban Planning (3) GEB F.2.

Problems and responses to contemporary urban growth and change. Development of theories of urban planning and design. Introduction to zoning, planning regulations and codes, professional practice. Relationship of environmental design disciplines, citizen groups, and individuals to planning. 3 lectures.

CRP 213 Population and Housing Studies (3)

Collection, organization, analysis and presentation of information and data related to city and regional planning. Analytical applications to population composition and distribution; housing needs, characteristics and markets; community services. 3 lectures. Prerequisite: CRP 212.

CRP 214 Land Use and Transportation Studies (3)

How cities and regions work. Relationship between human activities and patterns of land use and circulation. Spatial analysis and locational theories. Methods for conducting studies to describe, analyze, and map land uses. Transportation analysis, traffic impact, and circulation patterns. 3 lectures. Prerequisite: CRP 212.

CRP 216 Computer Applications for Planning (3)

Introduction to the use of microcomputer applications for planners including spreadsheets, statistical applications, database, graphics. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories. Prerequisite: CSC 110.

CRP 240 Additional Planning Laboratory (1–2)

Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 or 2 laboratories.

CRP 314 Planning Theory (3)

Theories of planning. Role of planner in society, purpose of planning, administrative framework in which planning takes place. Alternative approaches to planning, values, ethics in planning. 3 lectures. Prerequisite: CRP 212.

CRP 315 Economic and Fiscal Analysis for Planning (3)

Basic theoretical frameworks for understanding regional economic trends. Techniques for analyzing the strengths and weaknesses of local and regional economies. Fiscal impact analysis and feasibility studies at the local level. 3 lectures. Prerequisite: CRP 212, CRP 213, CRP 214.

CRP 347, 348 Urban and Regional Design (3) (3)

Three-dimensional design of urban and regional areas within the comprehensive planning process. Effect of human activities on the form of the natural and built environment at differing scales. Miscellaneous course fee required—see *Class Schedule*. 3 laboratories. Prerequisite: CRP 203.

CRP 351, 352, 353 Community Planning Laboratory (4) (4) (4)

Case study application of planning theory to the community, its components, and to the city and its region. Relationships of city spaces and structures. Basic planning studies, plan-making and implementation. Computer applications. Field trips. Individual, team, and interdisciplinary approaches. Miscellaneous course fee required—see *Class Schedule*. 4 laboratories. Prerequisite: CRP 213, CRP 214, CRP 216, LA 213, GEOL 201, STAT 211.

CRP 400 Special Problems for Advanced Undergraduates (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: Consent of department head.

CRP 404 Environmental Law (3) (Also listed as FNR 404)

Detailed examination of the law governing use and protection of natural resources with focus on the legal institutions entrusted with the public duty of protecting the environment. 3 lectures. Prerequisite: Senior standing, or consent of instructor.

CRP 408 Water Resource Law and Policy (3) (Also listed as FNR 408)

Detailed examinations of the various legal systems of water use, regulation and management in California and the United States. Discussion of the key concepts and principles of state, federal and interstate water quality control; focusing on issues and problems, why conflicts occur and how solutions evolve. 3 lectures. Prerequisite: FNR 302 or instructor approval, senior standing.

CRP 409 Planning Internship (2–4) (CR/NC)

Work experience as a supervised employee in a planning or related agency or firm. Prior contract specifying the product of internship required between student, agency and faculty. Thirty hours work experience per unit of credit. Total credit limited to 4 units. Credit/No Credit grading. Prerequisite: Consent of instructor.

CRP 420 Planning Law (4)

Public controls protecting natural environmental systems. Land use and environmental controls. Review of control mechanisms. State and federal legislation. Legal implications of controls, public planning and policy issues. 4 lectures. Prerequisite: senior standing, or consent of instructor.

CRP 427 Local Economic Development Planning (3)

Goals, processes and approaches for planning local economic development. Theoretical principles and assumptions underlying local economic development programs. Alternative strategies and analytical techniques for planning economic development programs and projects. 3 seminars. Prerequisite: Senior standing.

CRP 430 Planning Administration (3)

Relationships of planning agencies to other governmental bodies, public agencies and citizen groups. The public planning agency and the private practitioner. Public and personnel relations. Current topics in planning administration. 3 lectures. Prerequisite: Senior standing.

CRP 435 Transportation Theory (3)

Circulation and transportation elements of the General Plan. Transportation planning theory, methods and tools related to systematic analysis of city and regional transportation problems including environmental impact assessment. Application of techniques for assessing transportation systems; gravity models, route selections, land use models and relationship to transportation. 3 seminars. Prerequisite: CRP 212, or consent of instructor.

CRP 442 Housing and Planning Seminar (3)

Investigation of housing issues, policies and programs from a planning perspective, including the economic underpinnings of land markets and housing markets, housing plans, finance, public programs, affordable housing. 3 seminars. Prerequisite: CRP 353 or consent of instructor.

CRP 444 Infrastructure and Planning Management (4)

Basic infrastructure systems necessary to support urban development. Basic components of systems and how they are planned, financed and managed. 4 seminars. Prerequisite: CRP 352, ENVE 331 or senior standing.

CRP 447 Design Regulations (3) (Also listed as ARCH 447)

Practical application of fundamental building code requirements and zoning regulations in the design process. Codes and regulations used including city zoning regulations, city parking and driveway standards, the Uniform Building Code, and the architectural barrier laws. 3 lectures. Prerequisite: ARCH 342, or consent of instructor.

CRP 451, 452 Regional and Environmental Planning Laboratory (4) (4)

Case study application of planning theory and methods to regional and environmental systems. Regional spatial development and resource use. Interrelationships between natural, economic, social and political systems. Field trips. Individual, team and interdisciplinary approaches. Miscellaneous course fee required—see *Class Schedule*. 4 laboratories. Prerequisite: CRP 353, FNR 304.

CRP 453 Planning and Design Laboratory (4)

Selected advanced laboratory applications, including urban and regional design. Miscellaneous course fee required—see *Class Schedule*. 4 laboratories. Prerequisite: CRP 348, CRP 452.

CRP 457 Planning Information Systems (3)

Computer based systems to manage information pertinent to planning. Approaches to systematic data acquisition, processing and maintenance. Potential of data base systems for information gathering and analysis. Miscellaneous course fee required—see *Class Schedule*. 2 seminars, 1 laboratory. Prerequisite: CRP 353.

CRP 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Projects typical of problems which graduates must solve in planning. Project results presented in a formal report. To be completed in two quarters. Minimum 120 hours time. Prerequisite: CRP 353, CRP 463.

CRP 463 Undergraduate Seminar (2)

Research and problem analysis in planning. Professional practice in planning. Professional ethics. Students present organized material on some subject of interest. 2 seminars. Prerequisite: CRP 409, CRP 452.

CRP 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

CRP 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 laboratories. Prerequisite: Consent of instructor.

CRP 472 Planning Colloquium (1) (CR/NC)

Lecture and discussion by faculty members and invited guests on controversial or topical planning related subject matter at campus and/or off-campus locations. Topics to be announced in advance by CRP Department. Total credit limited to 3 units. Credit/No Credit grading only. 1 seminar. Prerequisite: Upper division standing.

CRP 500 Individual Study (2–3)

Independent research, studies, or surveys of selected subjects. Total credit limited to 9 units. Prerequisite: Graduate standing with minimum of 12 core units.

CRP 501 Foundations of Cities and Planning (4)

Origins and evolutionary stages of settlement patterns and the use of land and natural environment. Changing spatial structure in the development of cities and regions. Beginnings and the historical development of the planning profession. 4 lectures. Prerequisite: Graduate standing.

CRP 505 Principles of Regional Planning (4)

History, development and major philosophical approaches of regions and regional planning, both in urban-centered and resource-based regions. Effects of relaxing natural, economic

and infrastructure limiting factors on growth and development of regions. Normative hierarchical emphasis of contemporary regional planning compared to emerging paradigms that alter the regional/local planning relationship. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

CRP 510 Planning Theory (4)

Theory of planning. Development of contemporary planning thought from varying sources and perspectives. Political and social context of planning. Alternative professional roles, and planning processes. Values and ethical issues in planning. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

CRP 513 Planning Research Methods (4)

Application of research design to planning issues. Comparison of case study, comparative and problem-solving methods. Primary and secondary data sources, including field survey techniques. 3 seminars, 1 supervision. Prerequisite: Graduate standing, STAT 211 or equivalent, or consent of instructor.

CRP 514 Computer Applications for M.C.R.P. (2)

Microcomputer applications used by planners. Focus on planners' adaptations of spreadsheets, statistical applications, data base systems, graphic presentation. Miscellaneous course fee required—see *Class Schedule*. 2 laboratories. Prerequisite: Graduate standing.

CRP 515 Presentation and Communication Techniques for Planners (3)

Basic techniques used in effective planning presentations. Introduction to various drawing media and delineation techniques for planners, three-dimensional visualization, graphic skills. Integration of visual and electronic media in presentations. Miscellaneous course fee required—see *Class Schedule*. 3 laboratories. Prerequisite: Graduate standing.

CRP 516 Quantitative Methods in Planning (4)

Problem recognition, data selection, analysis and synthesis with applications of system design, statistical techniques and symbolic modeling to urban design and regional growth and development policies. Miscellaneous course fee required—see *Class Schedule*. 3 seminars, 1 laboratory. Prerequisite: CRP 514, graduate standing or consent of instructor.

CRP 518 Policy Analysis for Planners (4)

Analysis of social, economic, and environmental context of public planning decisions. Externalities and other rationales for planning activities. Policy analysis tools for evaluating equity and efficiency aspects of plan implementation. Local funding options for community development and redevelopment. Non-monetary issues and techniques. 4 seminars. Prerequisite: CRP 501, CRP 510, CRP 514.

CRP 520 Feasibility Studies in Planning (4)

Fundamental analysis for assessing feasibility of public and private development projects. Principles and techniques for analyzing markets and assessing cash flow for individual projects. Economic, fiscal and tax impacts as factors determining public participation in private projects. 4 seminars. Prerequisite: CRP 501 or consent of instructor.

CRP 525 Plan Implementation (4)

Theory and practice of plan implementation. Regulatory and non-regulatory frameworks for plan implementation. Growth management, development regulation, capital improvement programs, redevelopment. 4 seminars. Prerequisite: CRP 510 or consent of instructor.

CRP 530 Planning Agency Management (3)

Preparation for mid-level and higher positions in public planning agencies and private firms. Applications of organization theory to planning agencies and firms. Work programs, staff development, budgets, contracting, proposal preparation, conflict management. Relationships with other agencies and firms, clients, public and media. 3 seminars. Prerequisite: CRP 501, CRP 510 or consent of instructor.

CRP 545 Environmental Planning, Policies and Principles (4)

Environmental planning as a field of inquiry and action. Review and application of policies and techniques used in environmental planning, including analysis of environmental programs and processes within the land use planning context. 2 seminars, 2 activities. Prerequisite: Graduate standing or consent of instructor.

CRP 548 Principles of City Design (3)

Introduction to the philosophy and theory particular to city design. Exploration of evaluation criteria and critical analysis of man's environment related to design and human needs. Spatial and form relationships, scale, human activities, concept formation, visual organization of the city, landscaping and architecture. 3 seminars.

CRP 552 Community Planning Laboratory (4)

Application of planning theory and methods to urban (community) planning. Analysis of issues, consideration of future alternatives, preparation of plan elements. Interrelationships and impacts of natural and built environments, economic and social conditions. Field trips. Individual, team and interdisciplinary approaches. Miscellaneous course fee required—see *Class Schedule*. 4 laboratories. Prerequisite: CRP 501.

CRP 553 Project Planning Laboratory (4)

Project-scale planning problems. Arranging structures, circulation systems, utilities and plant material on natural and urban sites to support human activity while minimizing disruption to natural systems. Includes planned unit developments, waterfronts, hillsides, campuses and commercial centers. Field trips. Miscellaneous course fee required—see *Class Schedule*. 4 laboratories. Prerequisite: CRP 515, CRP 548.

CRP 554 Regional Planning and Analysis (4)

Application of planning theory and methods to regional problems and issues. Research, analysis, synthesis and implementation practice. Interrelationships between natural, economic and political regions, technology, resource use. Field trips. Individual, team and interdisciplinary approaches. Miscellaneous course fee required—see *Class Schedule*. 4 laboratories. Prerequisite: CRP 501.

CRP 570 Selected Topics in Planning (3)

Directed group study of selected topics in planning theory. Total credit limited to 9 units. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

CRP 597 Policy, Planning and Management (4)

This course provides a synthesis of the M.C.R.P. program. Expansion and integration of material on planning principles, practice, theory and quantitative methods. 4 seminars. Prerequisite: CRP 409, CRP 420, CRP 510, CRP 516, CRP 518, CRP 525, CRP 530, CRP 552, CRP 554 and advancement to candidacy.

CRP 599 Thesis/Project (6)

Individual research under the general supervision of the faculty, leading to a graduate thesis or project of suitable quality. Prerequisite: CRP 513, advancement to candidacy, consent of department head.

CRSC—CROP SCIENCE**CRSC 101 Orientation to Crop Science (1) (CR/NC)**

Understanding the depth and breadth of field crops, fruit and vegetable production and plant protection. Examination of the potential career opportunities and introduction to both student and professional organizations and affiliations. Required of all Crop Science Department students. Credit/No Credit grading only. 1 activity.

CRSC 123 Forage Crops (4)

Forages as a world resource in food and animal production, soil and water conservation and sustainable agricultural systems. Forage use systems: pasture and range, green chop, silage, hay and cubes. Identification and management of limiting factors of forage plant growth. Botany of legumes and grasses. Grass, legume and weed identification. Forage crop improvement. Forage composition and quality. Antiquality factors. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory.

CRSC 131 Introduction to Crop Science (4)

Production principles for field and vegetable crops. Fundamental botany, taxonomy and cultural practices. Soil tillage, fertilization, seed selection, planting and harvesting methods, irrigation, weed control, pest control, and crop rotation. Production practices for cotton. A field trip to a major California production area is required. Not open to students with credit in CRSC 230. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory.

CRSC 132 Cereal Grain Production (4)

Production, adaptation, distribution, and utilization of major grain crops harvested by combine, including wheat, barley, oats, corn, rice, sorghum, rye, triticale, and millets. Field trips to major California cereal production areas. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CRSC 131 or CRSC 230.

CRSC 133 Row Crop Production (4)

Adaptation, distribution, production, processing, and utilization of major row crops such as potatoes, tomatoes,

dry beans, and sugar beets. Special emphasis on working with beds and furrows. Field trip to a major California row crop production area required. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CRSC 131 or VGSC 230.

CRSC 200 Special Problems for Undergraduates (2–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

CRSC 201 Agricultural Chemical and Equipment Safety (2)

Principles and applications of agricultural chemical and equipment safety for enterprise project participants primarily. Pesticide toxicology, poisoning symptoms, medical treatment, safe handling and application techniques. Pesticide laws and regulations. Safe operation of tractors, implements, and processing equipment. Equipment demonstrations. Repeatable, but not for credit. 2 activities.

CRSC 202 Enterprise Project (1–4) (CR/NC)

Beginning field experience in production and marketing of an agronomic crop, under faculty supervision. Project participation is subject to approval by the department head and the Cal Poly Foundation. Degree credit limited to 4 units. Credit/No Credit grading only. Prerequisite: CRSC 201, or consent of instructor.

CRSC 221 Weed Science (4)

Identification, life histories, and control of common, noxious, and poisonous California weeds. Weed control chemicals and equipment for cultivated crops, irrigation systems, range, wastelands, aquatics, forests. 3 lectures, 1 laboratory. Prerequisite: BOT 121 or CRSC 131 or FRSC 131.

CRSC 230 Agronomic Crop Production (4) GEB F.2.

Production, harvest, and use of important cereal and field crops in California. Production areas, crop rotations, disease and pest control. Field trip required. Not open to students with credit in CRSC 131. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory.

CRSC 231 Commercial Seed Production and Conditioning (4)

Production and processing of certified and commercial seed including seed technology, germination, quality control, cleaning and storage, and seed laws. Field trip to a seed conditioning plant required. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CRSC 131 or consent of instructor.

CRSC 304 Plant Improvement (4)

Principles and techniques used to develop new plant varieties. Sexual reproduction, inheritance, selection and biotechnology methods useful in breeding of plants. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CRSC 131 and BIO 303.

CRSC 311 Insect Pest Management (4)

Principles of controlling insect pests including biological, cultural, physical, and chemical controls. Identification of insects injurious to California field, fruit, and vegetable crops.

Insecticide formulation and methods of application. Pesticide laws and regulations. 3 lectures, 1 laboratory. Miscellaneous course fee may be required—see *Class Schedule*. Prerequisite: CHEM 121 or introductory courses in biology, botany or zoology or consent of instructor.

CRSC 327 Vertebrate Pest Management (4)

Vertebrate pests injurious to crops, livestock, forest products, wildlife, stored products and humans. Life habits, identification, control methods, and materials. Related laws and regulations. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: Junior standing.

CRSC 330 Advanced Forage Crop Production (4)

Three methods of producing, harvesting and utilizing forage species; grazing, haying and ensiling plant materials. Forage identification, hay grades and quality; preservatives to enhance quality. Grazing systems; forage mixtures versus single species; problems in pasturing, fencing, the silage-making process and silo structures. Field trip to a production area required. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CRSC 123, CRSC 131 or CRSC 230 or consent of instructor.

CRSC 333 Greenhouse Vegetable Production (4)

Development, practices, history, and future of crop production in greenhouses. Research applications, commercial applications, production problems, marketing, and economics. Special emphasis on growing transplants in greenhouses and use of nutrient solutions. Field trips to a commercial greenhouse operation and/or analysis lab required. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CHEM 122, CRSC 133, SS 221 or consent of instructor.

CRSC 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Any CRSC 100- or 200-level course or consent of department head.

CRSC 402 Enterprise Project (1–4) (CR/NC)

Advanced experience in production of an agronomic crop. Development of a plan for field operations, a marketing plan, and a budget. Management decision-making. Project participation is subject to approval by the department head and the Cal Poly Foundation. Degree credit limited to 4 units. Credit/No Credit grading only. Prerequisite: CRSC 202, and consent of instructor.

CRSC 405 Advanced Weed Science (4)

Group study and discussion of the importance of the ecology and biology of weeds for successful management; integrated weed management; herbicide selectivity based on mode of actions; herbicides and the environment; regulatory aspects of weed control. Field trip required. Miscellaneous course fee may be required—see *Class Schedule*. 3 seminars, 1 laboratory. Prerequisite: CRSC 221 or consent of instructor.

CRSC 410 Crop Physiology (4)

Environmental, chemical, and biological interrelationships associated with the physiology of crop production. Field trip

is required. 3 lectures, 1 laboratory. Prerequisite: CRSC 131, CRSC 230, FRSC 131, FRSC 230 or VGSC 230; and CHEM 328.

CRSC 411 Experimental Techniques and Analysis (4)

Principle experimental designs used in agriculture and methods of analysis of data collected from each. Statistics and computers utilized. Field practice in planning and layout of typical experiments. 3 lectures, 1 laboratory. Prerequisite: Junior standing and MATH 117 or equivalent, and STAT 211 or consent of instructor.

CRSC 421 Oil and Fiber Crops (4)

Culture, harvest, grading, and marketing of cotton, soybean, sunflower, safflower, and other oil and fiber crops. Field trips to major centers of production and marketing required. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CRSC 133, CRSC 221 and BOT 121.

CRSC 422 Tropical Crop, Fruit and Nut Production (4) (also listed as FRSC 422)

Production, distribution and utilization of major agronomic, fruit and nut crops grown exclusively in the tropics. Includes discussions of tropical weather systems and climates, tropical soils, tropical cropping systems and slash-and-burn agriculture. 3 lectures, 1 laboratory. Prerequisite: CRSC, VGSC or FRSC 100/200-level course, or consent of instructor.

CRSC 431 Advanced Insect Pest Management (4)

Strategies and case studies of modern insect pest management. Group study and discussion of integrated pest management (IPM) of insects and mites. Pesticide resistance management, insect and mite monitoring, pest management regulatory issues, biotechnology applications, biological/microbial control, and preparation for Pest Control Advisor's licensing. Industry speakers. Field trips required. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CRSC or consent of instructor.

CRSC 441 Biological Control of Insects (4)

Biological control of insects to include history of classical methods, augmentation and inundative release of beneficial arthropods, nematodes, microbials, and other biorational agents. Identification of beneficial arthropods to family level. Laws and regulations governing use of biocontrol agents. Field trips to insectories, quarantine facilities, crop production areas. 3 lectures, 1 laboratory. Prerequisite: CRSC 311 or consent of instructor.

CRSC 445 Cropping Systems (4)

Systems approaches to improvement of agricultural situations. Consideration of human factors and the agroecosystem in efforts to create a more sustainable agriculture. Field trip required. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: SS 121 and BOT 121, or CRSC 131, or BOT 326, or consent of instructor.

CRSC 461, 462 Senior Project (3) (3)

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 180 hours total time. Prerequisite: CRSC 411.

CRSC 463 Undergraduate Seminar (2)

Oral presentation and leadership of group study on recent developments in the major field. 2 seminars.

CRSC 470 Selected Advanced Topics (2–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 2–4 lectures. Prerequisite: Consent of instructor.

CRSC 521 Advanced Crop Production (4) (Also listed as VGSC 521)

Production and management of crops under intensive and extensive cultural systems and low-input agriculture. Interaction between the various growth factors at various levels of production and interaction of cultural practices and plant requirements. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: Graduate standing and consent of instructor.

CRSC 527 Animal Damage Management (4)

Animal damage management in natural ecosystems, agroecosystems, disturbed environments, and urban settings. Ecological aspects of various problem wildlife species in both nation and international settings. Holistic approach to identifying and mitigating damage or losses caused by problem wildlife species. One field trip is required. Miscellaneous course fee may be required—see *Class Schedule*. 3 seminars, 1 laboratory. Prerequisite: CRSC 327 or consent of instructor.

CRSC 581 Graduate Seminar in Crop/Fruit Production (3) (also listed as FRSC 581)

Group study of current problems, trends and research results pertaining to production or marketing of field, vegetable or fruit crops. 3 seminars. Prerequisite: Graduate standing.

CSC—COMPUTER SCIENCE

CSC 110 Computers and Computer Applications: MS-DOS (3)

GEB F.1.

The computer as a problem-solving tool. A practical introduction to microcomputers, timeshared computer systems and fundamental computing concepts. Use of applications software for word processing, spreadsheets, and communications. Credit not allowed for CSC majors. 2 lectures, 1 activity.

CSC 111 Introduction to Computer Applications for the Sciences (3)

GEB F.1.

Exploration of capabilities of computers as tools in science and undergraduate studies. Emphasis is on an introduction to computer applications and application software in both Macintosh and MS-DOS environments with examples drawn from biology, physics, chemistry and statistics. Credit not allowed for CSC majors. 2 lectures, 1 laboratory.

CSC 112 Pascal Programming (3)

Fundamental concepts of computing. Techniques for problem solving with computers. Writing and running

programs in the programming language Pascal. Hands-on experience with text editors and other programming support tools. Credit not allowed for CSC majors. 2 lectures, 1 activity.

CSC 113 Computers and Computer Applications: Macintosh (3) GEB F.1.

The computer as a problem-solving tool. A working introduction to microcomputers, networked computer systems and related concepts. Several applications software packages, including electronic mail and word processing. Credit not allowed for CSC majors. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 activity.

CSC 118 Fundamentals of Computer Science I (4) GEB F.1.

Introduction to the syntactic and execution characteristics of a modern programming language. Basic ideas of algorithmic problem solving and programming, using principles of top-down design, stepwise refinement, and procedural abstraction. Basic control structures, data types, and I/O conventions. 3 lectures, 1 activity.

CSC 120 Principles of Business Data Processing (4) GEB F.1.

Fundamental concepts of digital computing. Survey of computing devices, systems, and applications software for business data processing. Credit not allowed for CSC majors. 4 lectures. Prerequisite: High school algebra.

CSC 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

CSC 201 FORTRAN Programming (3)

Programming in extended FORTRAN language with emphasis on program efficiency and advanced features. Comparison of FORTRAN implementations. 3 lectures. Prerequisite: CSC 118, and MATH 131 or MATH 141.

CSC 203 COBOL Programming (3)

Structure of the Common Business-Oriented Language (COBOL). Coding fundamentals and program logic. Writing of complete COBOL programs applied to typical business data processing problems. 3 lectures. Prerequisite: Any computer programming course.

CSC 204 C and UNIX (3) GEB F.1.

Extensive programming in the C language. Operators, standard I/O functions, strings, pointers and arrays, data types and storage classes. The UNIX programming environment: features of the UNIX shell, shell programming and using UNIX system functions from C. Credit not allowed for CSC majors. 3 lectures.

CSC 207 BASIC Programming (3)

Advanced programming methods using the BASIC language. Language features, data types, file structures, error handling, and string processing. Structured programming and problem solving techniques in BASIC. 3 lectures. Prerequisite: CSC 110, CSC 111, CSC 112, CSC 113 or equivalent, or consent of instructor.

CSC 209 Selected Programming Languages (3)

Language to be studied will be selected from high level programming languages of current interest. Emphasis on language syntax and usage, and unique features. Intended for proficient programmers who want to learn another programming language. *Class Schedule* will list topic selected. Total credit limited to 6 units. 3 lectures. Prerequisite: CSC 218.

CSC 215 Computer Architecture I (4) (Also listed as CPE 215)

Assembly level computer organization. Basic machine representation of numeric and non-numeric data. Assembly level instruction sets, their corresponding addressing modes, and the underlying computer architecture. Introduction to algorithmic problem solving and program design in assembly language. Intended for CPE and CSC majors. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: EE 219 (or concurrent enrollment) and CSC 218.

CSC 218 Fundamentals of Computer Science II (3)

Issues concerned with development of high quality software: specifications, abstract data types, and paradigms for the design and implementation of large software systems. Computational complexity and its use in the analysis of algorithms. Elementary and structured data types: arrays, records, access, and file types. Specification and implementation of user-defined data types and their applications: stacks, queues, and priority queues. 3 lectures. Prerequisite: CSC 118.

CSC 219 Linear Programming (3)

Introduction to linear programming, the simplex algorithm, duality, sensitivity and post optimal analysis. Use of linear programming techniques to solve linear optimization models. 3 lectures. Prerequisite: 6 units of college mathematics.

CSC 221 Assembly Language Programming (4)

Techniques of structured assembly language programming on micro-computers. Credit not allowed for CSC majors. 3 lectures, 1 laboratory. Prerequisite: A minimum of 3 units of high level languages, e.g. FORTRAN, Pascal, Modula 2, Ada or C.

CSC 240 Programming Environments I (3)

Professional use of C and UNIX, including UNIX utilities, system interfaces and all aspects of C syntax and semantics. Programming exercises stressing abstract data types, object-oriented approaches to software engineering principles for constructing large C programs. 3 lectures. Prerequisite: CSC 218 or equivalent.

CSC 241 Advanced Topics in UNIX (3)

Advanced techniques in UNIX. System calls and library functions, shell scripts, and selected UNIX tools. 3 lectures. Prerequisite: CSC 240.

CSC 245 Discrete Structures (3)

Introduction to structures and proof techniques of computer science: sets, functions, relations, elementary combinatorics, propositional and predicate logic. Boolean algebra, proof techniques, verification of algorithm correctness, elementary complexity of algorithms, recurrence relations, applications

of graph theory. Not open to students with credit in MATH 124. 3 lectures. Prerequisite: MATH 118 and MATH 119 or equivalent.

CSC 248 Computer System Administration (2)

Fundamental concepts of system administration in a Unix operating system environment; use of shell scripts and utilities; techniques of networks and data communications; methods of system maintenance and accounting. 2 seminars. Prerequisite: CSC 240 or permission of instructor.

CSC 251 Digital Computer Applications (2) GEB F.1.

Programming techniques and procedures with applications to engineering problems in FORTRAN. Introduction to numerical methods and simulation. 2 activities. Prerequisite: MATH 142 or MATH 132, PHYS 131 or PHYS 121.

CSC 255 Computer Graphics Applications (4)

For students who wish to learn computer graphics in their own disciplines. Use of Paint and Draw systems to create graphics on the CRT display and on film, color printer, PostScript printers and plotters. Use of business graphics packages to create various charts and presentation graphics. Credit not allowed for both CSC 255 and CSC 455 or CSC 456. 3 lectures, 1 laboratory.

CSC 302 Computers and Society (3) GEB F.2.

Social, ethical, political and technological implications and effects of computers in the modern world. Examination of the benefits and side-effects of computer applications and automation. 3 lectures. Prerequisite: junior standing and F.1. computer literacy course.

CSC 311 Numerical Engineering Analysis (4)

An intensive survey of numerical analysis techniques used for solving problems in engineering. Areas include solution of nonlinear equations, solution of linear systems, interpolation, numerical quadrature, ordinary differential equations, boundary value problems. 4 lectures. Prerequisite: Knowledge of a high level programming language, e.g. FORTRAN and/or C, and MATH 242 or equivalent.

CSC 331 Numerical Linear Analysis (3)

Introduction to methods currently available to engineers, scientists and mathematicians for solving nonlinear equations. Computer methods in matrix algebra. Solution of a system of linear equations by direct and iterative methods. Curve Fitting techniques. Applications to problems in engineering and science. 3 lectures. Prerequisite: MATH 133 or MATH 143 or equivalent, and knowledge of a high level of programming language, e.g. FORTRAN, Pascal, Ada, or C.

CSC 332 Numerical Analysis I (3)

Computer solutions of nonlinear equations and systems of linear equations. Polynomial interpolation. Numerical quadrature. Introduction to the solution of ordinary differential equations. 3 lectures. Prerequisite: MATH 143 or equivalent and knowledge of a high level of programming language, e.g. FORTRAN, Pascal, Ada, or C.

CSC 333 Numerical Analysis II (3) (Also listed as MATH 333)

Solution of systems of differential equations, predictor-corrector methods, stiff equations. Approximation methods:

cubic splines, B-splines, Bezier curves, least squares, methods for solving boundary value problems. 3 lectures. Prerequisite: CSC 332 or equivalent.

CSC 342 Programming Environments II (4)

Graphical user interfaces and the software development tools of their environments. Development of window-oriented programs using the environments' systems programming language. 3 lectures, 1 laboratory. Prerequisite: CSC 240 and CSC 345.

CSC 345 Data Structures (3)

Development of high quality software; specifications, abstract data types, and paradigms for design and implementation of large software systems. Abstract data types and their specification and implementation for basic data structures: lists, priority queues, tables, trees and graphs. Complexity analysis and recursive algorithms. 3 lectures. Prerequisite: CSC 245 or MATH 124.

CSC 346 File Structures (3)

Principles of file organization. Analysis of time-space trade offs for secondary searching and sorting algorithms. Sequential, indexed sequential, hashed, B-Tree and multiple-key files. Secondary storage devices, blocking and buffering, data compression. 3 lectures. Prerequisite: CSC 345.

CSC 347 Introduction to Database Systems (4)

Basic principles of database management systems (DBMS) and of application development using DBMS. DBMS objectives, systems architecture, database models with emphasis on Entity-Relationship and Relational models, data definition and manipulation languages, the Structured Query Language (SQL), database design, application development tools. 3 lectures, 1 laboratory. Prerequisite: CSC 345.

CSC 349 Theory and Analysis of Algorithms (3)

Intermediate and advanced algorithms and their analysis. Topics will include mathematical, geometrical, and graph algorithms and NP-complete problems. Additional topics will be chosen from pattern matching, file compression, cryptology, dynamic and linear programming, and exhaustive search. 3 lectures. Prerequisite: MATH 143 and CSC 345.

CSC 350 Discrete Dynamic Systems (3)

Analytical and simulation modeling and analysis of systems. Statistics and techniques of performance measurement and evaluation. Operational analysis. Introduction to discrete event and continuous simulation. 3 lectures. Prerequisite: Knowledge of a high level of programming language, e.g. FORTRAN, Pascal, Modula 2, or C, STAT 211 or STAT 321 or consent of instructor.

CSC 351 Programming Languages I: Design (3)

Comparison of structure and semantics of various high level programming languages. BNF grammars. Language design issues and techniques, including parameter passing, storage allocation and mapping and binding time. 3 lectures. Prerequisite: CSC 215, CSC 245, CSC 345.

CSC 360 Continuous Dynamic Systems (3)

Modeling, computer simulation and analysis of dynamic systems represented by ordinary differential equations.

Applications of high level languages for continuous system simulation. Selected applications. 3 lectures. Prerequisite: MATH 242 and knowledge of a high level programming language, e.g. FORTRAN, Pascal, Modula 2, or C.

CSC 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

CSC 401 Real-Time Programming and Ada (3)

Ada programming language emphasizing real-time programming, software engineering, and parallel programming. Basics of the language and the architecture of Ada software systems. Includes packages, exceptions, generic types, pragma's representation clauses, and tasks. Tools in the Ada Programming Support Environment (APSE). 3 lectures. Prerequisite: CSC 345.

CSC 404 Computer Networks (4) (Also listed as CPE 404)

Communications architectures and distributed systems; multicomputer complexes and interprocessor communications; communications media, message switching, and communications protocol standards. 3 lectures, 1 laboratory. Prerequisite: CSC 304, CSC 453, or consent of instructor.

CSC 405 Computer Networks II (4) (Also listed as CPE 405)

Network architectures and protocols; network performance analysis; the theory of error detection and correction; other advanced topics such as routing, network management, integrated services, satellite networks, fiber optics. 3 lectures, 1 laboratory. Prerequisite: CSC 404 or consent of instructor.

CSC 414 Authoring Languages and Systems (4)

Advanced techniques utilizing the computer to assist individualized instruction. Comparison between authoring languages and authoring systems. Emphasis on advanced features of authoring languages and their applications in computer-based education. 3 lectures, 1 laboratory. Prerequisite: CSC 112 or CSC 118.

CSC 420 Artificial Intelligence (4)

Programs and techniques that characterize artificial intelligence. Programming in LISP. 3 lectures, 1 laboratory. Prerequisite: CSC 345.

CSC 421 Knowledge Based Systems (4)

In-depth treatment of knowledge representation, utilization and acquisition in a programming environment. Emphasis on the use of domain-specific knowledge to obtain expert performance in programs. 3 lectures, 1 laboratory. Prerequisite: CSC 420.

CSC 427 Computer-Based Educational Systems I (4)

Introduction to the design and implementation of computer-based educational systems. Emphasis on sound generation and videodisk overlay to create a multi-media learning environment. 3 lectures, 1 laboratory. Prerequisite: CSC 414.

CSC 433 Numerical Analysis III (3) (Also listed as MATH 433)

Methods for solving special systems of equations. Iterative and direct methods. Solution of partial differential equations by the finite difference method. Method of characteristics. Methods for finding eigenvalues and eigenvectors including the QR method. 3 lectures. Prerequisite: CSC 332 or equivalent.

CSC 440 Software Engineering I (3)

Introduction to the software lifecycle. Methods and tools for the analysis, design, and specification of large, complex software systems. Project documentation, organization and control, communication, and time and cost estimates. Group laboratory project. 2 lectures, 1 laboratory. Prerequisite: CSC 345.

CSC 441 Software Engineering II (3)

Continuation of the software lifecycle. Methods and tools for the implementation, integration, testing and maintenance of large, complex software systems. Program development and test environments. Group laboratory project. 2 lectures, 1 laboratory. Prerequisite: CSC 440.

CSC 445 Theory of Computing I (3)

Finite state machines and regular languages. Pushdown automata and context-free languages. Turing machines. Computation theory, computational complexity, and program verification. 3 lectures. Prerequisite: CSC 245 or equivalent.

CSC 447 Database Management Systems Implementation (3)

Data structures and algorithms used in the implementation of Database Systems. Implementation of data and transaction managers: access methods interfaces, concurrency control and recovery, query processors and optimizers. Introduction to implementation of distributed database systems. 3 lectures. Prerequisite: CSC 346 and CSC 347.

CSC 450 Programming Languages II: Description and Analysis (4)

Regular languages and finite automata. Table-driven lexical analysis. Recognition of reserved words. Symbol table construction. Parsing: top-down (LL) and bottom-up (LR). Table-driven versus recursive descent parsing. Context-free languages and pushdown automata. 3 lectures, 1 laboratory. Prerequisite: CSC 351, CSC 445.

CSC 451 Programming Languages III: Compiler Implementation (4)

Intermediate translation forms. Runtime representations. Generation of object code by compilers. Local optimization: constant propagation, folding, common subexpression removal. Global optimization, invariant code removal, operator strength reduction. Register allocation. 3 lectures, 1 lab. Prerequisite: CSC 450.

CSC 453 Introduction to Operating Systems (4)

Introduction to sequential and multiprogramming operating systems; kernel calls, interrupt service mechanisms, scheduling, files and protection mechanisms, conventional machine attributes that apply to operating system implementation, virtual memory management, and I/O

control systems. 3 lectures, 1 laboratory. Prerequisite: CPE 315.

CSC 454 Implementation of Operating Systems (4)

Design and implementation of multiprogramming kernels, systems programming methodology, interprocess communications, synchronization, device drivers and network access methods. 3 lectures, 1 laboratory. Prerequisite: CSC 453.

CSC 455 Computer Graphics (4)

Graphics hardware and primitives. DDA, polygon filling, windowing and clipping. 2D and 3D transformations, 3D rendering, backface removal, depth sorting. Shading and illumination techniques. Basic fractal forgeries. 3 lectures, 1 laboratory. Prerequisite: CSC 345.

CSC 456 Advanced Rendering Techniques (4)

Illumination models, reflectance, absorption, emittance, Gouraud shading, Phong shading, raytracing polyhedra and other modeling primitives, coherence, acceleration methods, radiosity, form factors, advanced algorithms. 3 lectures, 1 laboratory. Prerequisite: CSC 455.

CSC 458 Computer Graphics Seminar (2)

Current topics in computer graphics. Total credit limited to 4 units. 2 seminars. Prerequisite: CSC 455.

CSC 461, 462 Senior Project (2) (3)

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 150 hours total time. Prerequisite: Recommended: CSC 440 for CSC 461; CSC 441 for CSC 462.

CSC 463 Undergraduate Seminar (2) (CR/NC)

Presentations by students of topics of interest to computer science professionals. Students make presentations of professional quality that are evaluated by the entire class. Possible topics include computers and society, ethical issues in computing, social and legal implications of computing, interpretation of technical material for management. Notable speakers from industry are invited to address the class. Offered only on a Credit/No Credit basis. 2 activity periods.

CSC 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

CSC 472 Object Oriented Design (3)

C++ syntax and semantics. Principles of object oriented programming, classes with inheritance and polymorphism as extensions of abstract data types, function and operator overloading. Basic object oriented design principles, class relationships and diagrams. 2 lectures, 1 laboratory. Prerequisite: CSC 240 and CSC 345.

CSC 484 Computer Vision (3)

Fundamental issues in computer vision. Convolution, edge detection and image segmentation. Pattern classification methods and neural networks. Stereoscopic vision and

optical flow. 3 lectures. Prerequisite: CSC 345, CSC 221, MATH 204, MATH 143 or consent of instructor.

CSC 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

CSC 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

CSC 500 Directed Study (2-3) (CR/NC)

Individual directed study of advanced topics. Total credit limited to 4 units. Credit/No Credit grading only. Prerequisite: Fully classified graduate standing and consent of instructor.

CSC 501 Languages and Translators (4)

Advanced programming language and translator concepts. Language concepts to be covered will be selected from current state-of-the-art languages and current issues in language design. Compiler concepts will include retargetable code generation, use of translator-writing systems, and error recovery. 4 seminars. Prerequisite: CSC 451, graduate standing or consent of instructor.

CSC 502 Database Systems (4)

Current topics in database systems: distributed databases and transactions, nested and long-running transactions, distributed concurrency control, semantic and object-oriented data models, database systems for non-traditional applications: engineering design databases, active, logic, temporal, multi-media, and real-time databases. 4 seminars. Prerequisite: CSC 447.

CSC 503 Operating Systems (4)

General concepts of computer architecture and operating systems. Design features of advanced computers, general time-sharing systems and schemes for dynamic memory allocation, scheduling and protection. Dynamic linkage between subroutines. Intercommunication between input/output and processors. 4 seminars. Prerequisite: CSC 453, graduate standing or consent of instructor.

CSC 504 Computer Architecture (4)

Comparative study and design of multiprocessor, dataflow, RISC, high level language and other new computer architectures. VLSI processor design techniques. 3 seminars, 1 laboratory. Prerequisite: CSC 315, graduate standing or consent of instructor.

CSC 505 Theory of Computing II (4)

Advanced topics in theoretical computer science from such areas as automata theory, cellular automata theory, computational complexity, and program verification. 4 seminars. Prerequisite: CSC 445, graduate standing or consent of instructor.

CSC 506 Artificial Intelligence (4)

Advanced programming approach to the study of artificial intelligence. Experience in developing programming tools such as discrimination nets, pattern matching and agendas. Extensive programming in at least one AI language. 3 seminars, 1 laboratory. Prerequisite: CSC 420, graduate standing or consent of instructor.

CSC 507 Computer Simulation I (4)

Principles and organization of simulation software. Executive programs for interactive control of continuous, discrete and combined system simulations. Specification, design and development of simulation support packages. Structure and techniques for development of real-time, queue management, graphics interface, and validation components of simulation systems. 4 seminars. Prerequisite: STAT 211 or STAT 321, graduate standing or consent of instructor.

CSC 517 Computer Simulation II (4)

Advanced topics in simulation. Simulation languages and systems, distributed simulation, training systems. Management of simulation projects. Verification and validation methodologies. 3 seminars, 1 laboratory. Prerequisite: CSC 507, graduate standing or consent of instructor.

CSC 527 Computer-Based Educational Systems II (3)

Comparison of several authoring languages and systems as they affect the design of multi-media computer-based educational systems. Emphasis on features for special purposes such as education of the handicapped. 3 seminars. Prerequisite: CSC 427, graduate standing or consent of instructor.

CSC 531 Numerical Methods I (4)

Introduction to advanced methods used in numerical analysis. Finite element methods for one and two-dimensional problems. Study of transforms including the Fast Fourier Transform and the Fast Hartley Transform. Review of the software supporting these methods. 4 seminars. Prerequisite: CSC 332 or equivalent, graduate standing or consent of instructor.

CSC 570 Current Topics in Computer Science (2-3)

Directed group study of selected topics for graduate students. Topics will normally consist of continuations of those in CSC 501-CSC 506 and other topics as needed. *Class Schedule* will list topic selected. Topic credit limited to 9 units. 2 to 3 seminars. Prerequisite: Graduate standing and evidence of satisfactory preparation in computer science.

CSC 585 Cooperative Education Experience (6) (CR/NC)

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

CSC 590 Seminar in Computer Science (3)

Current problems and research in the field of computer science through discussions and selected readings. Group study of selected advanced topics. 3 seminars. Prerequisite: Graduate standing.

CSC 595 Cooperative Education Experience (12) (CR/NC)

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

CSC 599 Thesis/Project (2-3) (2-3)

Individual research or activity under faculty supervision leading to an acceptable thesis or project. Prerequisite: Graduate standing and consent of instructor.

DANC-DANCE**DANC 131 Beginning Ballet (2)**

Fundamentals of ballet technique stressing alignment, turnout, five basic positions, seven movements of dance, and terminology. 2 activities.

DANC 132 Beginning Modern Dance (2)

Fundamentals of modern technique stressing alignment, off-centered use of torso, floorwork, movement phrases, and improvisation exercises. 2 activities.

DANC 133 Beginning Jazz Dance (2)

Introduction of jazz dance techniques stressing a variety of styles, alignment, isolation, polyrhythms, syncopation, improvisation, and phrasing. Performance technique and presentation of simple dance phrases. 2 activities.

DANC 134 Beginning Social Dance (2)

Selected ballroom dances including the cha-cha-cha, foxtrot, merengue, rumba, samba, swing, tango, waltz, and discotheque. Emphasis on alignment, etiquette, leading and following, performance techniques, and presentation of simple dance phrases. 2 activities.

DANC 135 International Folk Dance (1)

Introduction to international folk dances including round, longway, and square sets. Study of various dance steps, formation, positions, historical and cultural background. 1 activity.

DANC 211 Dance Fundamentals (2)

Body placement, alignment, rhythmic analysis and movement techniques. Theory and practice of fundamentals to promote ease and efficiency of movement. Introduction to dance forms such as ballet, modern, jazz, folk, square and social. 2 activities.

DANC 221 Dance Appreciation (3)**GEB C.2.**

Concentrates on major dance works and artists from the 19th century to present. Includes cultural contexts as well as styles and forms used in dance. Introductory survey of major experiments in dance. 3 lectures.

DANC 231 Intermediate Ballet (2)

Continuation of training in basic technical skills in ballet stressing phrasing, performance, and more complex step patterns. 2 activities. Prerequisite: Consent of instructor.

DANC 232 Intermediate Modern Dance (2)

Continuing study of DANC 132 with emphasis on various movement styles, phrasing, more complex step patterns, and performance. 2 activities. Prerequisite: Consent of instructor.

DANC 233 Intermediate Jazz Dance (2)

Continuation of DANC 133 with emphasis on more extensive movement vocabulary. 2 activities. Prerequisite: Consent of instructor.

DANC 234 Intermediate Social Dance (2)

Continuation of DANC 134. Emphasis on variations, styles, and performance skill. 2 activities. Prerequisite: Consent of instructor.

DANC 320 Dance Notation (3)

Introduction to the major dance notation systems, emphasizing the theory, reading and writing of Labotation. 1 lecture, 2 activities. Prerequisite: One DANC activity class or consent of instructor.

DANC 321 Dance History (3) GEB C.3.

Historical influences on contemporary Western dance from prehistoric times to the present, with special emphasis on European, African and Hispanic sources. 3 lectures. Prerequisite: One DANC activity class or consent of instructor.

DANC 340 Dance Improvisation and Composition (3)

Principles of dance composition and improvisation. Exploring movement potentials through studies in use of various stimuli, process of construction, and structuring of compositional forms. 1 lecture, 2 activities. Prerequisite: Consent of instructor.

DANC 345 Choreography and Workshop in Concert Preparation (3)

Problems connected with dance choreography. Workshops in concert preparation for Cal Poly's major dance production. Total credit limited to 12 units. 1 seminar, 2 laboratories. Prerequisite: By audition only.

DANC 346 Dance Production (3)

Directed experience in production of annual Orchesis Dance Concert and other public performances. Total credit limited to 12 units. 3 laboratories. Prerequisite: DANC 345 or consent of instructor.

DANC 381 Methods of Teaching Dance (4)

Dance forms such as folk, social, square, modern, ballet and jazz studies. Rhythmic structure and analysis of dance steps. Development of teaching methods and techniques, curricular materials and evaluation procedures related to teaching dance forms. 2 lectures, 2 activities. Prerequisite: DANC 131, 132, 133, or 134 and consent of instructor.

DANC 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research and studies or survey of selected problems in dance and related areas. Total credit limited to 4 units with a maximum of 2 units per quarter. Prerequisite: Consent of instructor and department head.

DANC 470 Selected Advanced Topics (1-3)

Directed study of selected topics for advanced dance students. *Class Schedule* will list topics selected. Total credit

limited to 6 units. 1-3 lectures. Prerequisite: Consent of instructor.

DANC 471 Selected Advanced Laboratory (1-3)

Directed group laboratory study of selected topics for dance students. *Class Schedule* will list topics selected. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor.

DSCI-DAIRY SCIENCE**DSCI 100 Enterprise Project (1-4) (CR/NC)**

Selection and completion of a management/production project under faculty supervision. Project participation is subject to approval by the project supervisor and the Cal Poly Foundation. Degree credit limited to 12 units. Credit/No Credit grading only.

DSCI 101 Dairy Feeds and Feeding (4)

Introduction to Dairy Cattle/Ruminant Nutrition. Classification and metabolism of nutrients. Nutrient content and identification of feeds common to dairy cattle. Nutrient analysis procedures and requirements. Ration formulation, feeding practices for maximizing growth and milk production. 3 lectures, 1 laboratory.

DSCI 121 Elements of Dairying (4)

General information on statistics and opportunities in the dairy industry. Composition and food value of dairy products. Common tests to determine quality of products. Principles and practices of the feeding and management of dairy cattle. 3 lectures, 1 laboratory.

DSCI 134 Introduction to Dairy Products Technology (4)

Science and technology in the development and manufacture of dairy food products. Equipment and dairy processing techniques for fluid milk, butter, cheeses, ice cream, yogurt, concentrated dairy foods and dried dairy foods. 3 lectures, 1 laboratory.

DSCI 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

DSCI 202 Dairy Product Marketing Programs (3)

Promotional programs of national dairy companies, integrated supermarket firms and independents. Programs of major dairy organizations; for example, National Dairy Council and Dairy Board, California Dairy Council, and Milk Advisory Board. 2 lectures, 1 activity. Prerequisite: DPT 134 or consent of instructor.

DSCI 222 Commercial Dairy Herd Management (4)

Commercial dairy practices from the standpoint of cost of feeding and management. Visits are made to successful dairy farms. 3 lectures, 1 laboratory. Prerequisite: DSCI 121.

DSCI 223 Frozen Dairy Foods (3)

Selection of ingredients, calculating, and processing ice cream, and related frozen products. 2 lectures, 1 laboratory. Prerequisite: DSCI 121.

DSCI 230 General Dairy Husbandry (4) GEB F.2.

Selection, breeding, feeding, and management of dairy cattle. Composition and food value of dairy products. Milk pricing, political influences, dairy industry statistics and opportunities. Producing and handling products. For non-dairy science majors. 3 lectures, 1 laboratory.

DSCI 231 General Dairy Manufacturing (4)

Composition and properties of fluid milk and manufactured milk products. Chemistry and microbiology of dairy products. Processes and equipment involved in the manufacture of butter, cheeses, and other fermented dairy products, frozen, condensed, and dried dairy foods. Elective course for non-dairy science students. Survey course for dairy husbandry majors. 3 lectures, 1 laboratory.

DSCI 233 Milk Processing and Marketing (4)

Composition and properties of fluid milk and its constituents. Equipment used to handle, process, and distribute fluid milk and related products. Product promotion, advertising and merchandising. Survey of national and local dairy marketing organizations. 3 lectures, 1 laboratory. Prerequisite: DPT 134.

DSCI 234 Dairy Foods Evaluation (3)

In-depth study of basic principles of sensory examination of dairy foods. Physiology of the various senses and their relationship to distinguishing the quality of dairy products by sight, flavor, body and texture. Product defects, causes, and methods of prevention. 1 lecture, 2 activities.

DSCI 241 Dairy Cattle Selection (3)

Selection of dairy cattle on type conformation and the correlation between type and production. Body condition scoring, animal analysis and linear classification. 1 lecture, 2 activities. Prerequisite: DSCI 121 or DSCI 230.

DSCI 250 Dairy Farm Safety and Production Practices (3)

Communication of dairy farm safety practices with emphasis on equipment operation, livestock handling and common farm hazards. Applied practices necessary for successful operation of a modern dairy farm. 2 lectures, 1 activity. Prerequisite: DSCI 121 or consent of instructor.

DSCI 301 Advanced Dairy Cattle Feeding (3)

Nutrition requirements of dairy cattle. Successful, economical feeding practices, ration formulation utilizing the computer. 2 lectures, 1 activity. Prerequisite: DSCI 101 or ASCI 101 and computer literacy elective.

DSCI 321 Lactation Physiology (3)

Mechanisms of milk component secretion, including protein, lactose and fat synthesis. Disorders of the mammary gland (mastitis) and appropriate management practices for mastitis control. 3 lectures. Prerequisite: DSCI 101, DSCI 121, ZOO 131, CHEM 121.

DSCI 323 Breeds, Fitting and Showing, and Management of Dairy Cattle (3)

Origin of modern dairy cattle breeds, breed comparisons, families, and pedigrees. Purebred herd management. Dairy cattle fitting and showing, photography, and merchandising. 2 lectures, 1 laboratory. Prerequisite: DSCI 121 or DSCI 230.

DSCI 326 Fermented Dairy Foods (3)

Methods, ingredients, and equipment used in the manufacture of fermented dairy products, such as sour cream, buttermilk, and yogurt. Plant practice and field trips to study commercial applications. 2 lectures, 1 laboratory. Prerequisite: BACT 221.

DSCI 330 Artificial Insemination (3)

Semen collection, evaluation processing and handling. Inseminating techniques. Fertility problems. Record keeping and measurements of reproductive efficiency. Endocrinology of reproduction. Estrous synchronization, embryo transfer and splitting of embryos. Ovarian structure and palpation of ovaries. 2 lectures, 1 laboratory. Prerequisite: DSCI 121 or consent of instructor.

DSCI 331 Concentration and Fractionation of Dairy Fluids (3)

Technology of evaporation and membrane separation processes applied to dairy fluids. Design and performance of evaporators and membrane processing systems (microfiltration, ultrafiltration, reverse osmosis). 2 lectures, 1 laboratory. Prerequisite: FSN 217 and DPT 134 or DPT 230.

DSCI 332 Dairy Inspection (3)

California dairy codes and score cards used for dairy plants and farms. Quality tests of dairy products. Practice in inspecting and scoring dairy farms and factories. Organizational structure of inspection services. 2 lectures, 1 laboratory. Prerequisite: DPT 233, BACT 221.

DSCI 334 Technology of Cheese Manufacture (4)

Chemistry and microbiology of cheese manufacture. Equipment, techniques and ingredients used to produce, handle, package, preserve and age different cheese varieties. Cheesemaking laboratory instruction in University dairy plant. 3 lectures, 1 laboratory. Prerequisite: BACT 221, DPT 233 or consent of instructor.

DSCI 336 Drying and Butter Technology (3)

Equipment, ingredients, and methods needed to manufacture butter, dairy spreads, and dried dairy products. Practice in university dairy plant and field trips to commercial operations. 2 lectures, 1 laboratory. Prerequisite: FSN 217 and DPT 134.

DSCI 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

DSCI 401 Physical and Chemical Properties of Dairy Products (3)

Composition, structure and properties of milk and other dairy foods. Physical and chemical changes which occur during processing and storage of dairy products. Objective measurement of physical and chemical properties. 2 lectures, 1 laboratory. Prerequisite: CHEM 328.

DSCI 402 Quality Assurance and Control of Dairy Products (3)

Current methods used to evaluate dairy products with respect to plant economics and consumer safety. Accurate

procedures for chemical and biological testing, statistical approach to sampling, and design and interpretation of HACCP programs for assuring product quality and safety. 2 lectures, 1 laboratory. Prerequisite: DPT 233.

DSCI 422 Breeding and Selection of Dairy Cattle (4)

Evaluation of inherited characteristics in dairy cattle from an economic standpoint. Proving and selecting sires and dams. 3 lectures, 1 laboratory. Prerequisite: BIO 303, DSCI 241.

DSCI 432 Advanced Dairy Herd Management (4)

Dairy herd management skills needed in dairy operations. Instruction and lab experience in management, records, feeding and nutrition, herd health, milk secretion, reproduction, mating and selection. 3 lectures, 1 laboratory. Prerequisite: DSCI 301, DSCI 323, DSCI 330, and DSCI 422.

DSCI 433 Dairy Plant Management and Equipment (3)

Basic management principles applied to the dairy industry. Industrial organization and control. Dairy plant location, design facilities and layout. Survey of financing applied to the dairy industry. Maintenance and operation of the equipment. 3 lectures. Prerequisite: PHYS 121 and junior standing.

DSCI 450 Dairy Biotechnology (3)

Current biotechnology used on dairies. Microbiological techniques, biochemical polymorphisms, recombinant DNA technology and their application in dairy production. Applied activities in the culture, transfer and manipulation of embryos. 2 lectures, 1 activity. Prerequisite: ZOO 131, DSCI 121, DSCI 330, BIO 303, and CHEM 328.

DSCI 461, 462 Senior Project (2) (2)

Selection and completion of research-oriented projects under faculty supervision. Project results are presented in a formal report. Minimum 120 hours total time. DSCI 461: 1 seminar and supervision. DSCI 462: Supervision.

DSCI 463 Undergraduate Seminar (2)

Reports on student papers, bulletins, periodical articles, and dairy research experiments. Sources of dairy husbandry information. Practice in oral reporting. Recent developments and research work in the dairy industry. 2 lectures.

DSCI 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

DSCI 522 Bioseparation Processes in Dairy Product Technology (3)

Physical and chemical principles governing bioseparation processes in dairy product technology. Factors influencing mass transport phenomena as it relates to filtration, size exclusion chromatography, ion exchange, dialysis, centrifugation, crystallization and other unit operations. Laboratories emphasize application of bioseparations of commercial importance. 2 lectures, 1 laboratory. Prerequisite: DPT 401 or FSN 407, FSN 435. CHEM 302 recommended.

ECON–ECONOMICS

ECON 105 Personal and Consumer Economics (4)

Personal choices—goals, savings, investment, buying methods, borrowing, taxes, insurance. Practical applications of principles of marginalism, present value indexing, expected value, etc. Emphasizes personal welfare with some social welfare analysis and contemporary consumer issues. 4 lectures.

ECON 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Sophomore standing and consent of department head.

ECON 201 Survey of Economics (3)

GEB D.3.

Basic material covered in Principles of Economics, ECON 211, 212 in a less detailed and technical manner. For majors requiring one quarter of economics. Not open to students with previous credit in ECON 211 or 212 or equivalent. 3 lectures. Prerequisite: Sophomore standing.

ECON 211 Principles of Economics (3)

GEB D.3.

Macroeconomics: principles and applications in the theory of national income, output and employment. Determination and measurement of the national product. Inflation, money, banking, monetary and fiscal policies. Not open to majors in Economics and Business. Not open to students with credit in ECON 222. 3 lectures. Prerequisite: Sophomore standing.

ECON 212 Principles of Economics (3)

Microeconomics: principles and applications in the theory of producer and consumer behavior, and the distribution of factor income with focus on the output market. Effect on the national economy. Not open to majors in Economics and Business. Not open to students with credit in ECON 221. 3 lectures. Prerequisite: Sophomore standing.

ECON 221 Microeconomics (4)

Microeconomic principles. Marginal and equilibrium analysis of commodity and factor markets in determination of price and output. Normative issues of efficiency and equity. Mathematical and statistical analysis and computer simulation. Not open to students with credit in ECON 212 or equivalent. 4 lectures. Prerequisite: Sophomore standing, CSC 120, STAT 251, and STAT 252.

ECON 222 Macroeconomics (4)

GEB D.3.

Macroeconomics analysis and principles. Aggregate output, employment, prices, and economic policies for changing these variables. Mathematical and statistical analysis and computer simulation. Not open to students with credit in ECON 211 or equivalent. 4 lectures. Prerequisite: ECON 221.

ECON 304 Comparative Economic Systems (3) GEB D.4.b.

Analysis of economic principles and institutions applicable to capitalism, socialism, and communism. 3 lectures. Prerequisite: ECON 201 or ECON 211 or ECON 222.

ECON 306 Applied Forecasting (4)

Causes and measurement of business fluctuations. Techniques of forecasting with microcomputer applications.

3 lectures, 1 activity. Prerequisite: ECON 201 or ECON 211 or ECON 222, CSC 120 and STAT 252.

ECON 311, 312 Intermediate Microeconomics (4) (4)

Economics of prices and markets. Demand and supply. Returns and costs, factor pricing and income distribution, welfare and economic progress. 4 lectures. Prerequisite: ECON 212 or ECON 221, MATH 221, MATH 222, STAT 251, STAT 252. For ECON 312: ECON 311.

ECON 313 Intermediate Macroeconomics (4)

Economic activity related to production and resource use to meet goals of society. Income, employment, economic growth and progress of the United States and its regions. Application of theory with microcomputer simulation models. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 activity. Prerequisite: ECON 211 or ECON 222, CSC 120, MATH 221, MATH 222, STAT 251, STAT 252, ECON 337.

ECON 314 Monetary and Fiscal Policies (4)

National economic fluctuation models and related corrective monetary and fiscal policies on income, employment, output, growth and prices. Application of theory with microcomputer simulation models. 3 lectures, 1 laboratory. Prerequisite: ECON 313.

ECON 323 Economic History of the Advanced World (4)

Analysis of the growth advancement of the economic institutions of Europe from about 600 to the present. Includes the spread of European economic structures and institutions to European colonies. Analyzes the internal development of the industrial economy in Europe and its expansion to other parts of the globe. Includes analysis of the interface of endogenous cultural values and the industrial imperative. Examines the role of economic imperialism, international trade, banking, transportation, and government actions to the evolution of the industrial economies. 4 lectures. Prerequisite: ECON 201 or ECON 211 or ECON 222.

ECON 324 American Economic History (4)

Topical and statistical analysis of the major trends and events of American economic history. Examines the causes and evolution of the United States economy from colonial times to the present. Assessment of the development of agriculture, transportation, industrial and government sectors of the economy and their interconnections. Application of the tools of the new economic history to the economic experience of the United States. 4 lectures. Prerequisite: ECON 201 or ECON 211 or ECON 221 or ECON 222.

ECON 325 Underdevelopment and Economic Growth (3)

GEB D.4.b.

Economic development: the less developed world and the American interest. 3 lectures. Prerequisite: ECON 201 or ECON 211 or ECON 222.

ECON 337 Money, Banking and Credit (4)

Principles and practices of monetary banking and credit institutions as applied to business activity and public policy. Use of mathematical analysis and computer simulation. 4 lectures. Prerequisite: ECON 211 or ECON 222, CSC 120, MATH 221.

ECON 338 Stochastic Modeling in Decision Making Systems (4)

Introduction to the theory and practice of decision making. Decision support systems applications of the microcomputer, exploring prevailing concepts through the development of topical projects related to the technology of decision making in economics and business. Practical applications discovering and exploring model applications and formulation. General techniques with applications in various areas of microeconomics and macroeconomics. Computerized projects required. 3 lectures, 1 activity. Prerequisite: CSC 120, STAT 252, MATH 221, ECON 211, ECON 212 or ECON 221, ECON 222.

ECON 339 Econometrics (4)

Application of statistical methods useful in economics. General linear regression model. Specific issues and problems related to economic models: multicollinearity, autocorrelation, heteroscedasticity, dummy variables, lagged variables, and simultaneous equation estimation. Application and evaluation of selected examples of empirical economic research. Microcomputer applications. 3 lectures, 1 activity. Prerequisite: CSC 120, MATH 221, MATH 222, STAT 251, STAT 252, or consent of instructor.

ECON 400 Special Problems for Advanced Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Consent of department head.

ECON 401 International Trade (4)

Theory of comparative advantage, gains from trade, and recent developments in trade theory; examination of tariffs, quotas, exchange controls, other trade barriers and underlying policy issues; review of U.S. commercial policy, GATT, the common market, regional and world economic organizations. 4 lectures. Prerequisite: ECON 212 or ECON 221.

ECON 402 International Monetary Economics (4)

Nature of international payments, U.S. balance of payments. Theory and practice of foreign exchange rate determination under the gold standard, paper standard, and IMF system; international money and capital markets; problems of international liquidity and monetary stability. 4 lectures. Prerequisite: ECON 401.

ECON 403 Industrial Organization (4)

Application of basic tools of economics to American Industry. Case studies of individual firms and industries. Performance of various business structures, such as monopoly and oligopoly. Effects of government regulation and antitrust policy. 4 lectures. Prerequisite: ECON 212, or ECON 221.

ECON 410 Public Finance and Cost-Benefit Analysis (4)

Principles of rational decision making with respect to government revenues and spending. Measurement of costs and benefits, and criterion selection. Taxation, user fees, deficit financing, public goods, neighborhood effects and zoning. Microcomputer applications. 3 lectures, 1 activity. Prerequisite: ECON 312, CSC 120.

ECON 413 Labor Economics (4)

Wage determination theory, basic economic factors that affect the labor movement, economic impact of union activities on employment, output, income, wages, prices, and national economic policy. 4 lectures. Prerequisite: ECON 212 or ECON 221.

ECON 417 Development of Economic Analysis (4)

Analysis of ideas related to the development of economic theory in the Western civilization from the Greeks through the classical, neoclassical, and Keynesian to the current post-Keynesian concepts. 4 lectures. Prerequisite: ECON 211, ECON 212 or ECON 221, ECON 222.

ECON 430 Internship (2–8) (CR/NC)

Placement of student for part-time supervised work experience in a business enterprise or government agency approved by the department head. Collateral reading correlated with work assignments and periodic written progress reports required. Credit/No Credit grading. Prerequisite: Junior standing.

ECON 431 Environmental Economics (4)

Economic dimensions of environmental abuse and protection. Use of simple economic models in developing and evaluating environmental policies. Overview of current environmental problems. Issues related to the sustainability of economic growth at the national and international levels. 4 lectures. Prerequisite: ECON 201 or ECON 211 or ECON 221.

ECON 432 Economics of Energy and Resources (4)

Economic theory and public policies as applied to problems of natural resources and energy. Dynamic resource and energy models developed with reference to public and private sector growth. Application of the principles of capital theory emphasized. Case studies. Computer software applications in the study of natural resources and energy under uncertainty. 4 lectures. Prerequisite: ECON 201 or ECON 211 or ECON 222.

ECON 433 Transportation Economics (4)

Analysis of the allocation of resources to the U.S. transport sector and specific transport modes as a result of their natural economic characteristics and public policy. 4 lectures. Prerequisite: ECON 201 or ECON 211 or ECON 222.

ECON 434 Urban Economics (4)

Application of basic tools of economic analysis to problems of urban regions. Causes and possible cures for inadequate growth rate, income levels, and the quality of life in urban regions. 4 lectures. Prerequisite: ECON 201 or ECON 211 or ECON 222.

ECON 460 Undergraduate Seminar in Research Methods (2)

Seminar in applications of economic theory with emphasis on current problems. 2 seminars.

ECON 461, 462 Senior Project (2) (2)

Selection and analysis of a problem under faculty supervision. Problems typical of those which graduates must solve in their fields of employment. Formal report is required. Minimum 120 hours total time.

ECON 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

ECON 500 Independent Study (1–4)

Advanced study planned and completed under the direction of a departmental faculty member. Open only to graduate students demonstrating ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head.

EDES–ENVIRONMENTAL DESIGN**EDES 101 Introduction to Architecture and Environmental Design (2) (CR/NC)**

Familiarization with the professional fields of architecture, landscape architecture, structural engineering, construction, and city planning. Introduction to the college's programs as they relate to individual aptitudes. The design process. Visiting speakers. Credit/No Credit grading. 2 lectures.

EDES 113 Graphic Analysis and Communication Skills (3)

Further development of freehand graphic communication skills for representation of conceptual ideas, analysis, and design concepts. Demonstrates the link between graphics, design process and communications. 3 laboratories. Prerequisite: ARCH 111.

EDES 311 Construction Contract Documents (5)

Basic skills and techniques required to produce construction contract documents conforming to current building codes and standards, including working drawings, specifications, bid documents, addenda and change orders. 5 laboratories. Prerequisite: ARCH 106, ARCH 111, LA 212.

EDES 408 Sustainable Architecture (3)

A survey course covering the concepts and principles of sustainable buildings and communities. Examines resource origins, delivery systems, treatment infrastructure, current use patterns, and potentials for conservation and re-use. Emphasis is on developing sustainable communities. 3 lectures. Prerequisite: Third year standing or consent of instructor.

EDUC–EDUCATION**EDUC 125 Efficient Reading (2) (CR/NC)**

Development of reading efficiency required in modern business, industry, and the professions, as well as study skills in subject matter content areas. Total credit limited to 4 units. Credit/No Credit grading only. 1 lecture, 1 activity.

EDUC 300 Introduction to the Teaching Profession (3) (CR/NC)

Supervised observation and participation in cooperating schools. Discussion focuses on subject matter taught in grades observed. Separate class sections for students interested in elementary or secondary teaching—see *Class Schedule*. Total credit limited to 6 units. Credit/No Credit grading only.

EDUC 301 The Learners and the Learning: Teaching Process in Elementary School (3)

Current theories of human learning and the social, emotional and cognitive development of students and teachers. The application of this knowledge to elementary school teaching will be emphasized. 2 seminars, 1 activity. Prerequisite: Junior standing.

EDUC 302 Multicultural Education in the Secondary School (3)

Multicultural elements which influence the academic and social environment of the American secondary school; professional responsibilities and legal requirements; review of successful programs aimed at making fundamental changes in the rules, roles and relationships in schools. 2 lectures, 1 activity. Prerequisite: Any course in GEB Area D.

EDUC 303 Effective Teaching, Classroom Management and Discipline in the Elementary School (4)

Instructional skills that can serve as guidelines for teaching. Effective classroom management, discipline and group dynamics. 3 seminars, 1 activity. Prerequisite: Junior standing.

EDUC 305 Teaching and Learning Processes in the Secondary School (3)

Learning processes: selected theories of learning related to teaching; theories of human development and learning; psychological principles involved in the teaching-learning event; self-evaluation of the prospective teacher. 3 lectures. Prerequisite: Any course in GEB Area D.

EDUC 400 Special Problems for Undergraduates (1-3)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 6 units, with a maximum of 3 units per quarter. Prerequisite: Junior standing and consent of instructor.

EDUC 402 Teaching Language Arts and Reading in the Elementary School (4)

Selection, organization, and presentation of lessons in all language arts areas. Integration of language arts with other curriculum areas and particularly reading. Cultural factors which influence language acquisition and the learning of English as a second language. Miscellaneous course fee required—see *Class Schedule*. 3 seminars, 1 activity. Prerequisite: EDUC 301, EDUC 303, EDUC 426, and admission to the Teacher Education Credential Program (Step I).

EDUC 403 Teaching Reading in the Secondary School (5)

Discussion of reading approaches, methods and materials in the secondary classroom with supervised field experience in teaching reading in a secondary school. 3 seminars, 2 activities. Prerequisite: EDUC 302, EDUC 305, or consent of instructor.

EDUC 406 Teaching Science and Mathematics in the Elementary School (4)

Curriculum and methods in teaching science and mathematics. Selecting, organizing, presenting, and evaluating science and mathematics lessons at the appropriate level throughout the curriculum. Emphasis on thinking processes, manipulative and process skills within the context of the state curriculum frameworks. Miscellaneous

course fee required—see *Class Schedule*. 2 seminars, 2 activities. Prerequisite: EDUC 301, EDUC 303, EDUC 426, and admission to the Teacher Education Credential program (Step I).

EDUC 407 Teaching Multicultural and Social Science Education in the Elementary School (4)

Curriculum and methods of teaching social science and multicultural education in the elementary school. Emphasis on thinking processes, problem solving, and process skills within the context of the state *History/Social Science Framework*. 3 seminars, 1 activity. Prerequisite: EDUC 301, EDUC 303, EDUC 426, EDUC 402, or consent of multiple subject coordinator. Concurrent: EDUC 410.

EDUC 409 Teaching in the Secondary School (4)

Principles of effective teaching; planning for instruction; management techniques involving instruction; peer coaching. Taken immediately prior to preliminary student teaching. 3 seminars, 1 activity. Prerequisite: Admission into the Single Subject Credential program.

EDUC 410 Preliminary Student Teaching (6) (CR/NC)

Part-time assignment in a classroom. Includes teaching activities under the direction of a selected cooperating teacher in consultation with a university supervisor. Assignment consists of an entire morning in the classroom (or the equivalent) for one quarter. Credit/No Credit grading only. Prerequisite: Completion of courses and requirements to preliminary student teaching and approval of campus screening committee for credential candidates.

EDUC 411 Classroom Management and Discipline in the Secondary School (3)

Principles of establishing classroom routines and procedures; maintaining classroom control; managing groups; school law; parent-teacher relations. 2 seminars, 1 activity. Prerequisite: EDUC 409. Concurrent enrollment in EDUC 410 recommended.

EDUC 420 Student Teaching (12) (CR/NC)

Full-time assignment in a classroom. Includes teaching activities under the direction of a selected cooperating teacher in consultation with a university supervisor. Assignment consists of an entire teaching day in the school for one quarter. Credit/No Credit grading only. Prerequisite: Completion of all courses and requirements prerequisite to full-time student teaching and approval by campus screening committee for credential candidates.

EDUC 421 Student Teaching Practicum (3)

Emphasis on solving problems related to field experience. Refining of organizational and instructional strategies, including an interdisciplinary approach to curriculum. Preparation for a job search. Professional and legal responsibilities of classroom teachers. 2 seminars, 1 activity. Concurrent enrollment in EDUC 420 required.

EDUC 422 Student Teaching Practicum (Single Subjects) (3)

Practices and problems of student teaching. Current innovations in teaching procedures and materials. Taken concurrently with single subject student teaching. 2 lectures, 1 activity.

EDUC 426 Language Development in the Multilingual K-12 Classroom (4)

Patterns of classroom organization, application of reading programs, approaches, methods in English and Spanish, and supervised field experiences in elementary classrooms with bilingual students. Miscellaneous course fee required—see *Class Schedule*. 3 seminars, 1 activity. Prerequisite: EDUC 301, EDUC 303, minimal fluency in Spanish, and consent of instructor.

EDUC 427 Theories, Methods, and Assessment for First and Second Language Acquisition (3)

Review of theories, methods, language assessment for N.E.P./L.E.P. students. Methods, including rationale and instruction of primary language skills and concepts, transitional English and redesignation procedures to L.E.P. status. A review of screening and assessment procedures. 3 seminars. Prerequisite: EDUC 426 or consent of instructor.

EDUC 440 Educating the Exceptional Individual (4)

Characteristics, incidence, and etiology of individuals with exceptional needs. Problems, assessment, and approaches toward accommodating exceptional students in the regular classroom. 4 seminars. Prerequisite: Any course in GEB Area E.1. or E.2, EDUC 300, EDUC 301 or EDUC 305.

EDUC 444 The Atypical Infant (4) (Also listed as PSY 444)

Exploration of issues pertinent to the development of atypical infants. Relationship of theory and research to intervention efforts with handicapped, developmentally delayed infants, and other at-risk infants. 3 seminars, 1 activity. Prerequisite: Junior standing, PSY 256 or HD 209, and EDUC 440 or consent of instructor.

EDUC 450 Behavior Disorders and Classroom Management Strategies (4)

Assessment of students with disruptive classroom performance. Basic strategies for facilitating social-emotional techniques which shift disruptive behavior to appropriate behavior. Evaluation of classroom modifications. 3 seminars, 1 activity. Prerequisite: EDUC 440 or consent of instructor.

EDUC 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

EDUC 480 Computer Based Curriculum (3)

Computer assisted instruction and computer based technology. Lesson planning and integration of technology into the K-12 curriculum. Familiarization with available educational courseware and software. Emphasis on classroom application. Miscellaneous course fee required—see *Class Schedule*. 2 seminars, 1 activity. Prerequisite: Completion of computer literacy GEB F.1. course, CSC 410 or CSC 416, or equivalent.

EDUC 500 Individual Study (1–3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Only 6 units may

be applied to degree requirements. Prerequisite: Consent of department head, graduate major adviser, and supervising faculty member.

EDUC 501 Problems and Practices in Curriculum Development (3)

Overview of major curriculum trends; planning and development of a comprehensive curriculum project geared to individual needs and interests. Emphasis on practicality. 3 seminars. Prerequisite: Graduate standing.

EDUC 503 Seminar in Language Arts Curriculum and Methods (3)

Language arts curriculum: objectives, methods, content, materials, evaluation, current trends and research. 3 seminars. Prerequisite: Graduate standing.

EDUC 504 Seminar in Science and Mathematics Curriculum and Methods (4)

In-depth study of science and mathematics curriculum. Objectives, methods, content, materials, evaluation, current trends, and assessments. Miscellaneous course fee required—see *Class Schedule*. 3 seminars, 1 activity. Prerequisite: Graduate standing.

EDUC 505 Seminar in Social Studies Curriculum and Methods (3)

In-depth study of the social studies curriculum: objectives, methods, content, materials, evaluation, current trends. 3 seminars. Prerequisite: Graduate standing.

EDUC 506 Models of Instruction (4)

Analysis of a wide variety of approaches to elementary and secondary teaching that guide instruction in the classroom and in other educational settings. In-depth analysis and implementation of selected teaching strategies. 3 seminars, 1 activity. Prerequisite: Graduate standing.

EDUC 507 Instructional Materials and Technology (3)

Examination of commercial and teacher-made supplemental materials, software, and technological tools in curriculum, and their implementation. Systematic evaluation of the effectiveness of materials and technology. Miscellaneous course fee required—see *Class Schedule*. 2 seminars, 1 activity. Prerequisite: Graduate standing.

EDUC 510 Educational Finance and Resource Allocation (3)

Financing public schools in America: historical and current sources and types of funding. District level and site level funding and budgeting including priorities and purchasing procedures. Financial implications of personnel contracts and obligations. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

EDUC 511 Educational Law and Governance (3)

Legal aspects of school administration including unions, collective bargaining, and contract administration. Governing roles of federal, state, and local agencies including boards and district administrators. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

EDUC 512 Educational Organization and Management (4)

Principles of organization, management, and leadership and their relationship to educational effectiveness and

productivity. Activity experience in the application of management theory in schools. 3 seminars, 1 activity. Prerequisite: Graduate standing or consent of instructor.

EDUC 513 Educational Planning and Decision Making (4)

Concepts of planning and decision making in educational administration including administrators' responsibilities associated with decision making roles in public schools. 3 seminars, 1 activity. Prerequisite: Graduate standing and consent of instructor.

EDUC 514 School Site Administration (4)

Principles and practices of effective building level administration in multicultural/multilingual environment. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

EDUC 515 Educational Program Management and Evaluation (3)

Supervision, management, and evaluation of educational curriculum and educational programs. Current trends in program management including mapping, monitoring, alignment. 2 seminars, 1 activity. Prerequisite: EDUC 501, graduate standing, or consent of instructor.

EDUC 516 Educational Personnel Management and Evaluation (4)

Principles and processes for the supervision and evaluation of certificated and classified staff including legal, research, and professional considerations. 3 seminars, 1 activity. Prerequisite: Graduate standing or consent of instructor.

EDUC 517 Organizational Development in Education (3)

Educator's role in group processes, including fundamentals of human relations, working with formal and informal groups, and applying organizational development strategies to enhance school effectiveness. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

EDUC 518 Administrative Services Fieldwork (3) (CR/NC)

Supervised fieldwork in school administration for supervision at the elementary and secondary level. Assignments must encompass an entire school year and must involve some multicultural experience. Total credit limited to 18 units, only 9 of which may be applied toward master's degree. Credit/No Credit grading only. Prerequisite: Admittance to the Administrative Services Credential program or consent of instructor.

EDUC 525 Reading Processes, Programs and Technology (4)

Physiological, psychological and psycholinguistic components of the reading process. Applications of research findings of teaching reading, including innovative programs and the use of reading technology. 3 seminars, 1 activity. Prerequisite: Graduate standing.

EDUC 526 Diagnosing and Remediating Reading Problems (4)

Formal and informal methods of diagnosing and remediating reading problems in classrooms and reading clinics. 3 seminars, 1 activity. Prerequisite: Graduate standing.

EDUC 529 Bilingual Special Education and Reading Instruction (4)

Principles, procedures and materials for teaching reading to bilingual students coupled with diagnostic and prescriptive methods for understanding reading problems of the bilingual and bilingual special education student. Miscellaneous course fee required—see *Class Schedule*. 2 seminars, 2 activities. Prerequisite: Graduate standing.

EDUC 530 Secondary, College, and Adult Reading Practices (4)

Principles, procedures, and materials for improving reading in the subject matter areas with students of different backgrounds and abilities in grades 7 through college. Field experiences in teaching reading to adults, college, or secondary students. 3 seminars, 1 activity. Prerequisite: Graduate standing.

EDUC 531 Supervision of Reading Programs (4)

Acquisition and application of the principles of supervision in a field setting by organizing, equipping and staffing classes; communicating with individuals and others employed in teaching reading; provide inservice programs and develop reading curriculum. Assessment of school reading programs. 2 seminars, 2 activities. Prerequisite: Graduate standing.

EDUC 532 Advanced Field Experiences in Education (3–12) (CR/NC)

Supervised advanced field experience and practical application of specialty for classroom teachers, reading and special education specialists, administrators and school support personnel. Total credit limited to 18 units for specialist credentials. Total credit limited to 6 units for the master's degree. 30 hours work experience per unit of credit. Credit/No Credit grading only. Prerequisite: Graduate standing, completion of basic teaching or administrative credential, or consent of instructor.

EDUC 540 Counseling and Career Guidance of Exceptional Students (4)

Basic guidance techniques for teachers working with exceptional individuals and their families. Career selection, preparation, and counseling. Transition from school to work, and community resource utilization. 3 seminars, 1 activity. Prerequisite: Graduate standing.

EDUC 542 Administration of Special Programs and Services (3)

Principles and practices of organizing and administering special education, reading, counseling, and other support programs. Assessment and placement procedures, middle management's role, overview of specially funded programs, historical precedents and future trends. 3 seminars. Prerequisite: Graduate standing.

EDUC 545 The Learning Handicapped: Characteristics and Teaching Strategies (4)

Characteristics of, and instructional strategies for students with learning handicaps. Organization and management of the special classroom. Evaluation of the instructional system. Individualization of instruction, and interaction in the total school environment. 3 seminars, 1 activity. Prerequisite: EDUC 440.

EDUC 546 Teaching Strategies for the Severely Handicapped (3)

Instructional strategies; current methodology and techniques of curriculum modification necessary to individualize instructional activities for the severely handicapped student. 3 seminars. Prerequisite: EDUC 551.

EDUC 547 Atypical Learning Patterns (4)

Theoretical considerations of learning patterns deviating from normal development. Educational implications of current theories of cognitive development and brain function as applied to disabled individuals. Development and application of a remedial therapy with appropriate individual(s). 3 seminars, 1 activity. Prerequisite: EDUC 440, EDUC 525, EDUC 545 or EDUC 551.

EDUC 550 Assessment of the Exceptional Individual (4)

Using norm referenced, criterion referenced, and curriculum based testing for assessing academic, behavioral, and physical status of exceptional individuals for referral purposes. Instructional and evaluation decisions regarding exceptional students in school settings. 3 seminars, 1 activity. Prerequisite: Graduate standing.

EDUC 551 Characteristics of the Severely Handicapped (3)

Characteristics, identification procedures, causation, needs, legal issues, community attitudes, educational and social programs for severely handicapped person. 3 seminars. Prerequisite: EDUC 440.

EDUC 553 Current Issues in Special Education (3)

Consideration of assumptions and techniques of educational research regarding the educational, personal, social and vocational difficulties affecting the development of individuals with exceptional needs; emphasizing their applicability to general and specific educational programs. 3 seminars. Prerequisite: Admission to Special Education Program or consent of instructor.

EDUC 555 Counseling and Communication (4) (Also listed as PSY 555)

Overview of the counseling profession, history, philosophy, theory and ethics. Emphasis on developing interviewing, assessment and communication skills. Required practicum. 3 seminars, 1 activity. Prerequisite: Graduate standing.

EDUC 556 Ethnic Counseling (4)

Socio-psychological and psycho-historical analysis of the visible ethnic and ethnic experience. Effects of poverty, history and the significance of oppression. Counseling techniques, assessment, community relations and required activities. 3 seminars, 1 activity. Prerequisite: Graduate standing.

EDUC 557 Career Development (4)

Counselor role in career decision making to include career choice theory, appraisal instruments, community referral resources, occupational information, computerized retrieval systems, and personal and social data and required activities. Miscellaneous course fee required—see *Class Schedule*. 3 seminars, 1 activity. Prerequisite: Graduate standing.

EDUC 558 Academic Counseling in Elementary Schools (4)

Effective developmental and preventative counseling in an elementary school's academic setting. 3 seminars, 1 activity. Prerequisite: Graduate standing and P.P.S. credential candidate, or consent of instructor.

EDUC 559 Academic Counseling in Secondary Schools (4)

Effective procedures in teaching and counseling in secondary schools to increase the academic and test taking performance of students. To include study skills, career planning and decision making, and application of computer software. 3 seminars, 1 activity. Prerequisite: Graduate standing and P.P.S. credential candidate, or consent of instructor.

EDUC 560 Counseling Theories and Assessment (4) (Also listed as PSY 560)

Counseling theories and concepts applied to individuals. Develop skills in interviewing, assessment intervention selection, termination and crisis intervention. Ethics and law included. 3 seminars, 1 activity. Prerequisite: EDUC 555, or consent of instructor.

EDUC 561 Group Counseling (3) (Also listed as PSY 561)

Theory and practice of group counseling, client selection, group structure, process and termination, and application of theories to specific developmental groups. Communication and facilitation skills emphasized with relevant ethics and law. 2 seminars, 1 activity. Prerequisite: EDUC/PSY 555, EDUC 560 or consent of instructor.

EDUC 562 Student Development—Higher Education (4)

Exploration of the roles and competencies of the student development specialist in higher education. Review of relevant developmental theory with emphasis on practical implementation. Explore current issues and trends in higher education, and organizational framework. 4 seminars. Prerequisite: Graduate standing.

EDUC 563 Counseling At-Risk Students (3)

Specific counseling strategies and issues related to chronic absenteeism of public school students. Will study alienation, violence, parenting, drugs and alcohol, HIV/AIDS, and other critical current topics. 3 seminars. Prerequisite: Graduate standing.

EDUC 573 Field Experience, Counseling (1–12)

Practical application of guidance services and counseling in public schools, colleges and community settings. Weekly seminars with university staff included. Total credit limited to 24 units. Maximum of 6 units may be applied toward Master of Arts in Education. Prerequisite: EDUC/PSY 555, EDUC/PSY 557 and consent of Counseling Coordinator Committee.

EDUC 581 Graduate Seminar in Education (1–3)

Contemporary problems in education. Trends, developments, and issues. Total credit limited to 9 units. Prerequisite: Graduate standing.

EDUC 582 Seminar in Educational Administration (4)

Review of current management practice, research, and literature related to school site and central office administration. 4 seminars. Prerequisite: Graduate standing

and completion of the Preliminary Administrative Services Credential or master's degree in administration.

EDUC 583 Advanced Educational Personnel Management and Evaluation (4)

Theory, practice, and skill development in the management and evaluation of educational personnel. Practice and skill development in the implementation of effective evaluation strategies. 4 seminars. Prerequisite: Graduate standing and completion of the Preliminary Administrative Services Credential or master's degree in administration.

EDUC 584 School Management, Communication and Organizational Effectiveness (2)

Application of principles of school management with emphasis on presentation, communications, and interpersonal relationships as they impact school effectiveness. 2 seminars. Prerequisite: Graduate standing, completion of the Preliminary Administrative Services Credential or master's degree in administration.

EDUC 587 Educational Foundations and Current Issues (4)

Historical, organizational, legal and philosophical characteristics of American education. Emphasis on the analysis of contemporary issues focusing on these characteristics. 4 seminars. Prerequisite: Graduate standing.

EDUC 588 Education, Culture, and Learning (4)

Cultural characteristics of educational institutions and practice. Review of theory and research relating to the social and organizational context in which learning and teaching takes place. 4 seminars. Prerequisite: Graduate standing.

EDUC 589 Research Methods and Analysis in Education (5)

Compare and contrast educational research methods to develop a plan which demonstrates a student's knowledge of basic research methodology, integration and application of descriptive and inferential statistics to research designs, computer technology. 4 seminars, 1 activity. Prerequisite: Graduate standing; completion of GEB F.1. computer literacy elective or equivalent, or consent of instructor.

EDUC 590 Research Applications in Education (4)

Application of research techniques to problems in education and human services. Students will be involved in applied research. 2 seminars, 2 activities. Prerequisite: Master's degree candidate, EDUC 589, and a minimum of 30 units in a master's degree curriculum.

EDUC 598 Reading and Conference (1-2) (CR/NC)

Reading and study material to be chosen with adviser. Not for degree credit. Total credit limited to 6 units. Credit/No Credit grading only. Prerequisite: 6 units of EDUC 599.

EDUC 599 Thesis or Project (3) (3)

Completion of a thesis or project pertinent to the field of education. Prerequisite: Consent of graduate committee and supervising faculty member(s).

EE-ELECTRICAL ENGINEERING

EE 110 Orientation (1)

Familiarization with the field of electrical and electronic engineering. 1 lecture.

EE 112 Electric Circuit Analysis I (2)

Introduction to basic circuit analysis. Resistive circuits, voltage and current sources, network theorems, op-amp circuits. 2 lectures. Prerequisite: MATH 142 or equivalent.

EE 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

EE 201 Electric Circuit Theory (3)

Application of fundamental circuit laws and theorems to the analysis of DC, and steady-state single-phase and three-phase circuits. For engineering majors except electronic/electrical. 3 lectures. Prerequisite: MATH 242, PHYS 133.

EE 208 Electronic Devices (3)

Internal operation, terminal characteristics, and models of diodes, transistors (bipolar and field-effect), and optical devices (LED's and phototransistors). 3 lectures. Prerequisite: EE 211, PHYS 211.

EE 211 Electric Circuit Analysis II (3)

Continuation of basic circuit analysis. Energy storage elements, RC and RL circuits, and phasors. 3 lectures. Prerequisite: EE 112, MATH 143. Concurrent: EE 241.

EE 212 Electric Circuit Analysis III (3)

AC power, 3-phase circuits. Mutual inductance, series and parallel resonance and two-port networks. 3 lectures. Prerequisite: MATH 242 (or concurrent), EE 211. Concurrent: EE 242.

EE 219 Logic and Switching Circuits (3) (Also listed as CPE 219)

Modulo-N arithmetic and digital coding techniques. Fundamentals of Boolean Algebra and minimization techniques. Multiple function synthesis using ROM's and PLA's. Combinational circuit design as it applies to computers. Sequential circuit elements, flip-flops, counters and shift-registers. 3 lectures. Prerequisite: CSC 118 or CSC 204.

EE 241 Electric Circuit Analysis Laboratory II (1)

Use of electrical and electronic test equipment. Experimental verification of circuit analysis concepts including Kirchhoff's Laws, Thevenin's Theorem, maximum power transfer and superposition. 1 laboratory. Concurrent: EE 211.

EE 242 Electric Circuit Analysis Laboratory III (1)

Observation of transient and steady-state phenomena, phase-shift circuits, resonance. Use of phasor diagrams. 1 laboratory. Prerequisite: EE 241 or consent of department chair. Concurrent: EE 212.

EE 248 Electronic Devices Laboratory (1)

Experimental determination of device characteristics and models. 1 laboratory. Prerequisite: EE 241. Concurrent: EE 208.

EE 251 Electric Circuits Laboratory (1)

Techniques of measurement of DC and steady-state AC circuit parameters. Equivalent circuits, nonlinear elements, resonance. 1 laboratory. Concurrent or prerequisite: EE 201.

EE 259 Logic and Switching Circuits Laboratory (1) (Also listed as CPE 259)

Laboratory synthesis of combinational and sequential logic circuits. Introduction to laboratory equipment such as digital oscilloscopes and logic state analyzers. Use of software (both off-the-shelf and customized) for logic simulation. Introduction to switch bouncing, hazards, and other logic faults. 1 laboratory. Concurrent: EE 219.

EE 301 Linear Systems Analysis (3)

Fourier analysis. Fourier and Laplace analysis with applications. Transfer functions. Pole-zero locations and system response. Development and use of Bode plots. 3 lectures. Prerequisite: EE 212, MATH 317.

EE 302 Linear Control Systems (3)

Automatic feedback control systems. Analysis of linear dynamic systems. 3 lectures. Prerequisite: EE 301.

EE 303 Power Transmission (3)

Electrical characteristics of three-phase overhead and underground power transmission lines. Development of models for different types of lines as well as interconnected power systems. Introduction of per unit calculations. Introduction of computer simulation methods. 3 lectures. Prerequisite: EE 301.

EE 304 Random Signals and Noise (3)

Probabilistic treatment of signals and noise in electrical engineering. Topics include the concept of probability, sample space, distributions, random variables, independence, moments, covariance, random processes, time and ensemble averages, stationarity, common processes, correlation functions, spectra, shot and thermal noise, filtering. 3 lectures. Prerequisite: EE 301.

EE 307 Digital Integrated Electronics (3)

Integrated logic circuits: RTL, DTL, TTL, I^2L , ECL, MOS, CMOS, interfacing different logic families. 3 lectures. Prerequisite: EE 208, EE 219.

EE 308 Electronic Circuits (3)

Analysis and design of linear small-signal amplifiers. 3 lectures. Prerequisite: EE 301, EE 307.

EE 309 Integrated Electronic Circuits (3)

Analysis and design of feedback amplifiers; operational amplifier applications. Design of analog/digital and digital/analog converters. Power supply design. Emphasis on IC implementation. 3 lectures. Prerequisite: EE 302, EE 308.

EE 313 Signal Transmission (3)

Distributed-circuit concepts and traveling waves. Transmission line parameters. Lines with and without reflection. Standing waves. Smith Chart and its applications.

Transmission line measurements and impedance matching techniques. 3 lectures. Prerequisite: EE 301.

EE 319 Digital System Design (3) (Also listed as CPE 319)

Introduction to finite automata theory and the design of digital systems utilizing state-machines, analysis and synthesis of state-machines. Design of synchronous, asynchronous, and pulse mode sequential circuits. Role of the microprocessor in implementing state-machines. Trade-offs between system design utilizing hardware, firmware and microprocessors. 3 lectures. Prerequisite: EE 219, EE 307.

EE 321 Electronics (3)

Semiconductor devices and circuits. Instrumentation amplifiers, power control rectifiers, feedback, pulse circuits, digital logic circuits. Not for Electronic or Electrical Engineering majors. 3 lectures. Prerequisite: EE 201.

EE 325 Energy Conversion Electromagnetics (3)

Fundamentals of electro-mechanical energy conversion. Magnetic circuits and electromagnetic devices. Theory of operation and operating characteristics of transformers, DC machines, AC induction machines, and synchronous machines. Stepper motors. 3 lectures. Prerequisite: EE 212 or EE 201, PHYS 133.

EE 327 Electronic Instrumentation and Measurement (4)

Principles and characteristics of instruments and instrumentation systems; analog and digital transducers; A/D conversion; data and signal transmission and amplification problems. Low level signal, high frequency signal, and high accuracy signal measurement problems. Automated instrumentation systems. 3 lectures, 1 laboratory. Prerequisite: EE 301, EE 308.

EE 328 Discrete Time Systems (3)

Discrete-time signals and the sampling theorem, basic systems concepts, solution of linear difference equations, Z transform. Discrete-time Fourier Transform, Discrete Fourier Transform (DFT). Cyclic convolution application of transforms to system analysis. Introduction to digital filtering. Relationships of digital filters to their continuous-time counterparts. 3 lectures. Prerequisite: EE 301.

EE 334 Electromagnetic Fields I (3)

Advanced treatment of static vector electric and magnetic fields and their sources. Magnetic fields in ferromagnetic materials. Laplace's equation and boundary value problems. 3 lectures. Prerequisite: PHYS 133, MATH 317.

EE 341 Linear Analysis Laboratory (1)

Fourier analysis. Two-port networks, frequency response and Bode plots. 1 laboratory. Prerequisite: EE 242. Concurrent: EE 301.

EE 342 Control Systems Laboratory (1)

Laboratory work in feedback control systems. 1 laboratory. Prerequisite: EE 341. Concurrent: EE 302.

EE 347 Digital Integrated Electronics Laboratory (1)

Experimental investigation of the characteristics of different logic families. 1 laboratory. Prerequisite: EE 248. Concurrent: EE 307.

EE 348 Electronic Circuits Laboratory (1)

Design, construction and testing of solid state amplifier to meet stated specifications. 1 laboratory. Prerequisite: EE 341, EE 347. Concurrent: EE 308.

EE 349 Integrated Electronic Circuits Laboratory (1)

Design of electronic subsystems using integrated circuits. 1 laboratory. Prerequisite: EE 342, EE 348. Concurrent: EE 309.

EE 353 Signal Transmission Laboratory (1)

Transmission and reflection measurements. Impedance matching techniques. 1 laboratory. Prerequisite: EE 341. Concurrent: EL 313.

EE 359 Digital System Design Laboratory (1) (Also listed as CPE 359)

Laboratory synthesis of combination and sequential logic circuits. Sequential subsystems analysis with the logic state analyzer. Fault testing and automated checkout procedures. Familiarization with the characteristics of SSI and MSI logic components. 1 laboratory. Prerequisite: EE 259, EE 347. Concurrent or prerequisite: EE 319.

EE 361 Electronics Laboratory (1)

Instrumentation amplifiers, feedback, rectifiers and power control, pulse and digital logic circuits. 1 laboratory. Prerequisite: EE 251. Concurrent or prerequisite: EE 321.

EE 365 Energy Conversion Laboratory (1)

Single-phase and three-phase transformers. Starting of rotating machines, evaluation of characteristics of rotating machines. 1 laboratory. Prerequisite: EE 242 or EE 251. Concurrent: EE 325.

EE 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

EE 401 Electromagnetic Fields II (3)

Time changing electric and magnetic fields. Maxwell's equations, with the relationship between field and circuit theory. Plane waves in dielectric and conducting media. Selected topics from wave polarization, reflection and refraction. 3 lectures. Prerequisite: EE 313, EE 334.

EE 402 Microwave Engineering (3)

Application of Maxwell's equations and boundary value problems to waveguide structures. Microwave equivalent circuit theorem. S-parameters. Stripline and microstrip line techniques. Passive microwave devices and components. Microwave active devices and components. 3 lectures. Prerequisite: EE 401.

EE 403 Fiber Optic Communication (3)

Propagation of light in optical fibers, attenuation and bandwidth. LED and Laser Diode sources for use with optical fibers. Optical sources, detectors, and receivers. Design of optical communication systems with applications in telecommunications and local area networks (LANs). 3 lectures. Prerequisite: EE 309, EE 401 or PHYS 207 and PHYS 323.

EE 405 High-frequency Amplifier Design (3)

Design of modern electronic amplifiers and amplifier systems with advanced techniques. Small signal wideband lowpass amplifier design utilizing both discrete and integrated devices. VHF, UHF amplifier design using S parameters. GaAs FET microwave distributed amplifier. Noise analysis. 3 lectures. Prerequisite: EE 313, EE 309.

EE 406 Power Systems Analysis I (4)

Introduction to electric power systems. Representation of power systems and components. One line diagrams and per unit calculations. Power limits and stability, system model representation of the synchronous machine, symmetrical faults, electrical insulation, grounding. Solution of power system problems by microcomputer techniques and time-share methods. 4 lectures. Prerequisite: EE 303.

EE 407 Power Systems Analysis II (4)

System protection, relays and relay systems, faults, load flow calculation, computer solutions, power system instrumentation and measurement techniques. Solution of power system problems by microcomputer techniques and time-share methods. 4 lectures. Prerequisite: EE 406.

EE 410 Power Control I (4)

Power semiconductor devices. Theory of power diodes, SCR, Triac, MOSFET, HEXFET, Diac, Unijunction transistor, etc., modeling of diode and SCR circuits, SCR trigger circuits, analysis of SCR circuit in rectifiers, choppers and dc motor control. 3 lectures, 1 laboratory. Prerequisite: EE 309, EE 325.

EE 411 Power Control II (4)

Analysis of SCR circuits in inverters and cycloconverters; modeling of inverter-induction motor drive system; regenerative braking; electric propulsion; digital computer study of motor control system. Line commutated inverters and HVDC converters, phase-locked loops and microprocessor based control systems. 3 lectures, 1 laboratory. Prerequisite: EE 410.

EE 412 Advanced Analog Circuits (3)

Application of linear integrated circuits to data acquisition problems: transducer interfacing, linear and nonlinear preprocessing, phase-locked loops, and high performance quantization and recovery (A/D, D/A conversion). 3 lectures. Prerequisite: EE 309, EE 414.

EE 413 Advanced Electronic Design (4)

Design of electronic circuits and sub-systems. Non-linear circuit applications, signal generators, voltage references, modeling and automatic test system design. 3 lectures, 1 laboratory. Prerequisite: EE 309.

EE 414 Introduction to Communication Systems (3)

Amplitude modulation. Frequency and phase modulation. Demodulation techniques. Bandwidth and power considerations. Noise in communication systems. 3 lectures. Prerequisite: EE 302, EE 304, EE 328.

EE 415 Communication Systems Design (3)

Design of modern electronic communication and telemetry systems. Emphasis: practical implementation and

comparative evaluation of various modulation systems. 3 lectures. Prerequisite: EE 309, EE 414.

EE 416 Digital Communication Systems (3)

Baseband (PCM, PAM, DM) signals and transmission. Bandpass (PSK, FSK, ASK) modulation and demodulation techniques. Digital communication signals in the presence of noise and detection of signals in Gaussian noise. Other topics such as: synchronization, quantization, multiplexing and multiple access, spread spectrum techniques. 3 lectures. Prerequisite: EE 414.

EE 417 Alternating Current Machines (4)

Alternating current machines. Generalized, operational and dynamic analysis. Steady-state and transient operation of synchronous machines and linear induction machines. 3 lectures, 1 laboratory. Prerequisite: EE 325, EE 365.

EE 418 Photonic Engineering (3)

Modern optical design with emphasis on the use of computers to design simple optical systems and to evaluate existing optical designs. Paraxial and exact ray tracing through thin and thick lenses, mirrors, and prisms. Radiometry and photometry. Electro-optic, acousto-optic, and magneto-optic modulators and their applications. Thermal detectors, semiconductor detectors, and charge coupled device (CCD) arrays. Miscellaneous course fee required—see *Class Schedule*. 3 lectures. Prerequisite: EE 401 or equivalent or PHYS 323.

EE 419 Digital Signal Processing (3)

Review of Z-transform, convolution and discrete Fourier Transform. Digital filter design. Fast Fourier Transform. Theory and applications of digital signal processors. 3 lectures. Prerequisite: EE 328. Concurrent: EE 459.

EE 420 Direct Energy Conversion (3)

Direct energy conversion, and storage, with consideration of resources, batteries, fuel cells, thermoelectricity, thermionic generators, solar energy, cells, MHD, power generation, and related topics. 3 lectures. Recommended as a complement to ME 415. Prerequisite: ME 302.

EE 421 Solid-state Microelectronics (3)

Physical basis of solid-state microelectronics. Passive and active integrated circuit components in Bipolar, MOS, thin and thick film systems. Diffusion, oxidation, ion implantation and other fabrication techniques. Microcircuit layout and design: system development, reliability and economic considerations. Future trends. 3 lectures. Prerequisite: Senior standing.

EE 424 Antenna Theory and Application (3)

Linear antenna theory. Antenna as a matching device. Antenna directivity, gain, efficiency, resistance, aperture, and reciprocity. Application of antenna theory to various types of antennas. 3 lectures. Prerequisite: EE 401.

EE 425 Analog Filter Design (3)

Approximation Theory. All pole filters. Frequency transformations. Elements of passive synthesis. Time delay filters. Theory and design of active filters. Sensitivity analysis. 3 lectures. Prerequisite: EE 309.

EE 431 Computer-Aided Design of VLSI Devices (3)

Design of VLSI circuits, design of subsystems, PLA's and finite-state machines, patterning, hand layout, and CIF programming. 3 lectures. Prerequisite: EE 319, EE 309.

EE 432 Digital Control Systems (3)

Theory and applications of digital computers in linear control systems. Discrete time methods are used in analysis and design studies. Digital control systems are synthesized. 3 lectures. Prerequisite: EE 302 or consent of instructor.

EE 433 Computer-Aided Design in Magnetics (4)

Variational principles, integral and partial differential equation methods. Application of integral and partial differential equation methods to electromagnetic field problems. Computer-aided design of electrical devices. Use of commercially available software. 3 lectures, 1 laboratory. Prerequisite: EE 325, EE 334.

EE 441 Microwave Laboratory (1)

Experimental investigation of vacuum-tube and solid state microwave sources, crystal and power detectors, coaxial cables, directional couplers and n-port devices. Measurement of SWR by slotted line and reflectometer techniques. Techniques for measurement of attenuation, frequency and power. 1 laboratory. Prerequisite: EE 313, EE 353, EE 401.

EE 443 Fiber Optics Laboratory (1)

Experimental investigation of the properties of optical fibers, sources, and detectors. Measurement of fiber physical characteristics, attenuation, losses, and bandwidth. Evaluation of an analog and digital fiber optic data link. 1 laboratory. Prerequisite: EE 349. Prerequisite or concurrent: EE 403.

EE 444 Power Systems Laboratory (1)

Protective relaying, coordination, and relay calibration. Power control using transformers, parallel operation of generators, and computer simulation of power systems. 1 laboratory. Prerequisite: EE 341, EE 406.

EE 445 Advanced Amplifier Design Laboratory (1)

Experimental investigation employing advanced techniques. Design of electronic amplifiers and amplifier systems utilizing recently developed components. 1 laboratory. Prerequisite: EE 353, EE 349. Concurrent or prerequisite: EE 405.

EE 455 Active Network Synthesis Laboratory (1)

Advanced laboratory study of sensitivity and stability of active networks prescribed for realization of transfer functions by active network synthesis techniques. Formal experiments and individual project work. 1 laboratory. Prerequisite: EE 349. Concurrent or prerequisite: EE 425.

EE 456 Communication Systems Laboratory (1)

Methods of analog and digital modulation and demodulation. Emphasis on spectral analysis, bandwidth requirements and other practical considerations of modulation and demodulation. 1 laboratory. Prerequisite: EE 342, EE 414.

EE 458 Photonic Engineering Laboratory (1)

Experimental investigation of the techniques used in processing optical signals. Formal experiments on electro-

optic modulation, acousto-optic modulation. Construction of an RF spectrum analyzer. Analog processing of optical signals, and charge-coupled array devices. 1 laboratory. Prerequisite or concurrent: EE 418.

EE 459 Digital Signal Processing Laboratory (1)

Experiments in digital filter design and digital signal processing emphasizing various areas of applications (communications, audio signals, speech processing). Formal experiments and individual project work. 1 laboratory. Prerequisite: EE 341. Concurrent enrollment in EE 419; knowledge of C or assembly language desirable.

EE 461, 462 Senior Project (3) (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 150 hours total time. Prerequisite: EE 325, EE 309, EE 334.

EE 463 Undergraduate Seminar (1) (CR/NC)

Discussion of new developments in the fields of power systems and control. Fields of employment and job considerations. Credit/No Credit grading only. 1 seminar. Prerequisite: Senior standing.

EE 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1-3 lectures. Prerequisite: Consent of instructor.

EE 471 Selected Advanced Laboratory (1-3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Consent of instructor.

EE 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 16 units. Prerequisite: Sophomore standing and consent of instructor.

EE 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 16 units. Prerequisite: Sophomore standing and consent of instructor.

EE 500 Individual Study (1-3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department chair, graduate adviser, and supervising faculty member.

EE 511 Electric Machines Theory (3)

Advanced topics in electric machines theory. Introduction to Park's transformation. Analysis of electric machines using Kron's generalized concept. Excitation systems. 3 seminars. Prerequisite: EE 325 or equivalent, graduate standing or consent of instructor.

EE 513 Control Systems Theory (4)

State representation of dynamic systems. Mathematical models of physical devices, controllability and observability. Design of closed-loop systems. Optimal control theory. 4 seminars. Prerequisite: EE 302 or equivalent, graduate standing or consent of instructor.

EE 514 Advanced Topics in Automatic Control (4)

Nonlinear control systems analysis, discrete-time control. Finite-precision digital controllers. Microprocessor mechanizations of linear and non-linear controls. Efficient coding of control algorithms. Overflow characteristics and optimal saturating control structures. 4 seminars. Prerequisite: EE 432 or EE 328, graduate standing or consent of instructor.

EE 515 Discrete Time Filters (4)

Analysis and design of digital filters using time-domain and transform techniques. Frequency response, aliasing problems and sampling issues. Recursive and non-recursive filters, digital filtering in numerical analysis, image processing, prediction algorithms. 4 seminars. Prerequisite: EE 414, graduate standing or consent of instructor.

EE 517 Information Theory (4)

Introduction to information theory and coding. Self and mutual information. Discrete and continuous information sources and transmission channels. Additive white Gaussian noise channel. Channel capacity. The Source- and Channel-Coding Theorems. Data compression. Huffman code. Block codes, including Hamming and linear codes. Parity and syndrome decoding. Convolutional codes. 4 seminars. Prerequisite: EE 414, EE 525, graduate standing or consent of instructor.

EE 518 Advanced Power System Analysis (3)

Symmetrical components. Unbalanced faults. Analysis by digital computer simulation. Load flow studies. Elements of power system stability. 3 seminars. Prerequisite: EE 406 or equivalent, graduate standing or consent of instructor.

EE 519 Power System Design (4)

Design studies involving aspects of an electric power system. Current industrial designs. Computer simulation techniques used extensively. 4 seminars. Prerequisite: EE 518, graduate standing or consent of instructor.

EE 520 Solar-Photovoltaic Systems Design (3)

Solar cell and storage battery theory, examination of insolation variability and optimization techniques, principles of grounding protection and control, a survey of power conditioning equipment and system integration techniques. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

EE 521 Computer Systems (4)

Organization of modern general purpose, high speed digital computer systems. Arithmetic units, control units, memories

and memory subsystems. Peripheral equipment. Cost and speed trade-offs in the design of such systems. 4 seminars. Prerequisite: EE 427, or consent of instructor.

EE 522 Microprocessor-Based Digital System Design (4)

Design and implementation of microprocessor-based digital systems. Their analysis and cost effective use in system design problems. Data acquisition and control systems. Role of microperipheral controllers. Laboratory problems associated with interfacing microprocessors to various systems. 3 seminars, 1 laboratory. Prerequisite: EE 404, or consent of instructor.

EE 523 Digital Systems Design (3)

Design of asynchronous sequential machines and pulse mode logic circuits. Selected automata theory topics include state compatibility analysis, state partition analysis, threshold logic, fuzzy logic. Modern digital system design. Analysis of MOS-LSI multiphase logic structures. Comparison of digital subsystems. Microprocessor as a digital subsystem module. 3 seminars. Prerequisite: EE 319, graduate standing or consent of instructor.

EE 524 Solid State Electronics (3)

Physical theory of solid-state devices. Properties of metal-semiconductor junctions and p-n junctions. Derivation of properties of diodes, transistors, and four-layer devices from basic physical and mathematical considerations. 3 seminars. Prerequisite: PHYS 412 or equivalent, graduate standing or consent of instructor.

EE 525 Stochastic Processes for Engineers (4)

Probability and stochastic processes used in random signal analysis. Response of linear systems to random inputs. Auto-correlation and power spectral densities. Applications in signal processing using the discrete Kalman filter. 4 seminars. Prerequisite: EE 304 or equivalent, graduate standing or consent of instructor.

EE 526 Digital Communications (4)

M-ary signals. Vector space representation of signals. Optimum receiver principles. Common signal sets. Signal space dimensionality versus time-bandwidth product. 4 seminars. Prerequisite: EE 414 and EE 525, or consent of instructor.

EE 527 Advanced Topics in Power Electronics (4)

Static variable speed AC and DC drives. Phase-controlled rectifiers and choppers in DC motor control. PWM in three-phase inverters, sinusoidal modulation techniques, control strategies for AC three-phase variable speed motor control using voltage source inverters, current source inverters and speed control of AC motors. Torque and speed pulsations. HVDC converters and DC transmission. 4 seminars. Prerequisite: EE 410, EE 411 or equivalent, graduate standing or consent of instructor.

EE 528 Digital Image Processing (4)

Two-dimensional spatial frequency transforms. Image enhancement, histogram equalization. Smoothing and sharpening. Image restoration, image encoding and segmentation. Descriptors. 4 seminars. Prerequisite: EE 414, EE 525, graduate standing or consent of instructor.

EE 529 Advanced Topics in Microwave Device Electronics (3)

Emphasis on device and circuit principles of active microwave solid-state devices, their noise aspects and systems applications. 3 seminars. Prerequisite: EE 401, PHYS 412 or equivalent, graduate standing or consent of instructor.

EE 530 Electro-Optics Systems (4)

Design of radiometric information optics and imaging systems. Remote sensing, guidance and tracking, fiber optic and laser communications. Component modeling and optimization of systems for detection of radiant flux with maximum signal to noise ratio. Modeling of source, intervening media, optical subsystem, focal plane, signal-conditioning electronics, and output and display. 4 seminars. Prerequisite: EE 401, EE 414 or equivalent, graduate standing or consent of instructor.

EE 563 Graduate Seminar (1)

Current developments in the fields of electrical and electronic engineering. Participation by students, faculty and guest lecturers. Open to graduate students with a background in electrical or electronic engineering. Total credit limited to 3 units. 1 seminar.

EE 570 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to graduate students and selected seniors with electrical and electronic engineering background. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1-3 seminars. Prerequisite: Graduate standing or consent of instructor.

EE 599 Design Project (Thesis) (2) (2) (5)

Each individual or group will select, with faculty guidance and approval, a topic for independent research or investigation resulting in a thesis or project to be used to satisfy the requirement for the degree. An appropriate experimental or analytical thesis or project may be accepted. Prerequisite: Graduate standing.

EET-ELECTRONIC ENGINEERING TECHNOLOGY

EET 438 Computer Technology I (4)

Analysis of computer circuits and components in a specific digital computer. Effects of computer architecture on machine and assembly language programming. Use of hardware and software aids for troubleshooting and development. 3 lectures, 1 laboratory. Prerequisite: EET 338.

EET 455 Electro-Optics Technology (4)

Fundamentals of electro-optics devices and circuits. Parameters, units, sources and systems found in electro-optics. Solving problems encountered in electronics and optics. Laboratory study of devices, circuits and systems. 3 lectures, 1 laboratory. Prerequisite: EET 335.

ENGL-ENGLISH

ENGL 101 Basic Writing I (4) (CR/NC)

Practice in writing expository prose with attention paid to sentence variety, fluency, and editing skills. Emphasis on reading and the writing process. Directed readings of exemplary writings. Credit/No Credit grading only. Repeatable. 4 lectures.

ENGL 102 Basic Writing II (4) (CR/NC)

Instruction in the writing process. Practice in the strategies of writing, revising, and editing paragraphs and essays with attention paid to focus, support, and organization. Directed readings of exemplary prose. Credit/No Credit grading only. Repeatable. 4 lectures.

ENGL 104 Writing Lab Tutorial (1) (CR/NC)

Individual tutorials of at least three hours a week in the University Writing Lab. Practice in various essay writing strategies based on a student's needs and at student's own pace. Preparation for freshman composition. Credit/No Credit grading only. Repeatable. 1 laboratory. Prerequisite: At least one quarter of basic writing.

ENGL 111 English Sentence Structure for ESL/EFL Students (4) (CR/NC)

Focus on the fundamentals of sentence patterns, sentence construction, and sentence combining within the context of the paragraph and story. Practice in writing a variety of effective sentences; practice in linking sentences in a unified paragraph controlled by a topic sentence. Credit/No Credit grading only. 4 lectures. Prerequisite: Non-native English speakers who need to develop skill in writing English sentences.

ENGL 112 English Paragraph Development for ESL/EFL Students (4) (CR/NC)

Focus on the fundamentals of paragraph development within the context of the essay and story. Writing paragraphs with strong topic sentences that control paragraph unity; linking paragraphs for a unified essay through transitions and the control of the thesis statement. Credit/No Credit grading only. 4 lectures.

ENGL 113 Essay Writing/ESL (4) (CR/NC)

Practice in essay writing with special attention paid to the writing process. Focus on using details and examples for effective development. Review of grammar problems specific to ESL students. Journal writing to enhance fluency. Directed readings of essays and fiction. Credit/No Credit grading only. 4 lectures. Prerequisite: ENGL 111 or ENGL 112, or consent of instructor.

ENGL 114 Writing: Exposition (4) GEB A.1.

Writing and stylistic analysis of expository papers. Study and application of techniques of exposition. Critical reading of model essays. 4 lectures.

ENGL 125 Critical Thinking (3) (Also listed as PHIL 125 and SPC 125) GEB A.2.

Nature of critical thinking. Analysis of inductive and deductive arguments. Practice in the composing of

arguments in English. 3 lectures. Prerequisite: ENGL 114 or equivalent.

ENGL 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems at the lower division level. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

ENGL 215 Writing: Argumentation (4) GEB A.4.

Writing and critical evaluation of argumentative papers. Techniques of research and evaluation of research sources. Discussion of elements of argumentation, inductive and deductive reasoning and use of supporting documentation in written discourse. Examination of special problems in invention, form, style and evaluation. Not open to students with credit in ENGL 218. 4 lectures. Prerequisite: ENGL 114 and ENGL 125 or PHIL 125 or SPC 125.

ENGL 218 Professional Writing: Argumentation and Reports (4) GEB A.4.

Extensive writing practice in professional situations: reports, proposals, letters, memoranda. Composing and conveying technical information. Methods of research. Analysis of writing situations. Analysis and criticism of student reports and technical reports. Not open to students with credit in ENGL 215. 4 lectures. Prerequisite: ENGL 114 and ENGL 125 or PHIL 125 or SPC 125.

ENGL 230 Masterworks of British Literature: Through the Eighteenth Century (4) GEB C.1.

Selected readings in British literature from its beginnings through the Eighteenth Century. Early and middle English works read in translation. Includes works by such authors as Chaucer, Shakespeare, Milton, Swift, Pope and Johnson. 4 lectures. Prerequisite: ENGL 114 or equivalent.

ENGL 231 Masterworks of British Literature: Romantic Period to the Present (4) GEB C.1.

Selected readings in British literature from the Romantic period to the present. Includes works by such Romantic, Victorian, Edwardian and Twentieth Century writers as Wordsworth, Byron, Tennyson, Shaw, Yeats and Eliot. 4 lectures. Prerequisite: ENGL 114 or equivalent, or consent of instructor.

ENGL 240 American Tradition in Literature (4) GEB C.1.

Selected readings from major authors that show the American literary tradition from the Colonial period into the Twentieth Century. Literary expression of movements that shaped the American character, including Puritanism, Deism, Transcendentalism and Naturalism. Includes works by such authors as Franklin, Emerson, Poe, Whitman, Dickinson, Twain, Frost, Hemingway and Faulkner. 4 lectures. Prerequisite: ENGL 114 or equivalent, or consent of instructor.

ENGL 251 Great Books of World Literature: Classical and Ancient World (3) GEB C.1.

Selected readings from world writings, beginning with the earliest epics through the literature of Greece and Rome. Includes such authors as Homer, Aeschylus, Sophocles, Euripides, Plato and Ovid. 3 lectures. Prerequisite: ENGL 114 or equivalent, or consent of instructor.

ENGL 252 Great Books of World Literature: Middle Ages, Renaissance and Enlightenment (3) GEB C.1.

Selected masterpieces from the fall of the Roman Empire up to the Eighteenth Century. Includes such authors as Dante, Cervantes, Shakespeare, Molière, Voltaire and Swift. 3 lectures. Prerequisite: ENGL 114 or equivalent, or consent of instructor.

ENGL 253 Great Books of World Literature: Romanticism and the Modern World (3) GEB C.1.

Selected works from the beginning of Romanticism up to the present. Includes material from literary movements such as Realism, Naturalism, Symbolism and Existentialism, with works by such authors as Goethe, Hugo, Keats, Wordsworth, Flaubert, Balzac, Dostoevsky, Woolf, Joyce and Beckett. 3 lectures. Prerequisite: ENGL 114 or equivalent, or consent of instructor.

ENGL 260 Children's Literature (3)

Analysis and evaluation of realism, traditional fantasy, modern fantasy, and poetry for children in multiple subject classroom grades K–8. 3 lectures. Prerequisite: ENGL 114 or equivalent, or consent of instructor.

ENGL 290 Introduction to Linguistics (4)

Overview of linguistics from its origin to present forms and practices. 4 lectures. Prerequisite: ENGL 114 or equivalent, or consent of instructor.

ENGL 302 Writing: Advanced Composition (4)

Writing and analysis of expository and argumentative papers at an advanced level. Discussion and application of rhetorical, stylistic and grammatical principles through writing and critical reading of essays. Practice in revising and editing papers. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

ENGL 310 Corporate Communication (4)

Instruction and practice in forms of communication characteristic of business and industry. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

ENGL 311 Advanced Professional Writing (4)

Professional writing as produced in industry and government. Analytic reports, manuals, instructions, specifications. Trade journal articles. Editing skills. Orientation to professional communication careers. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

ENGL 318 Writing for Scientific Journals (4)

Practice of the skills necessary in the preparation of articles for scientific journals. Extensive writing and copy-editing, and study of the forms and styles required by the professional societies in each field. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

ENGL 325 Creative Writing (4)

Instruction and practice in the writing, revising, and evaluating of fiction, poetry, or drama. Total credit limited to 8 units. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

ENGL 326 Literary Criticism (4)

Instruction and practice in writing, revising, and evaluating various kinds of critical writing. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

ENGL 330 British Literature: Medieval Period (4) GEB C.3.

Major works of the Old and Middle English periods in modern translation, including epic and lyric poetry, early religious writings, romance cycles and mystery and morality plays. Representative works include Beowulf, the Arthurian legends, Everyman and Chaucer's Canterbury Tales. 4 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 331 British Literature: The Renaissance (4) GEB C.3.

Major works of Elizabethan and Jacobean prose, poetry and drama. Literary responses to the foundations of humanism, individualism, nationalism and other forces of change leading from the medieval to the modern world. Representative writers include Spenser, Sidney, Donne, Jonson, Bacon and Milton. 4 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 332 British Literature: The Enlightenment (4) GEB C.3.

Major prose, poetry, and drama from 1660 to 1800, emphasizing the period's interest in order, reason, rules and decorum in both life and literature. Representative writers include Dryden, Swift, Pope, Johnson, Boswell and Defoe. 4 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 333 British Literature: Romanticism (4) GEB C.3.

Major works of the Romantic period. Romantic concepts of imagination, individualism, nature and the organic qualities of art. Representative writers include Blake, Wordsworth, Coleridge, Byron, Shelley and Keats. 4 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 334 British Literature: The Victorians (4) GEB C.3.

Major prose and poetry of the Nineteenth Century. Victorian concerns such as progress, belief, alienation and threats to the sense of personal identity in a technological age. Representative writers include Carlyle, Ruskin, Tennyson, Browning and Arnold. 4 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 335 British Literature: Twentieth Century (4) GEB C.3.

Selected prose, poetry, and drama reflecting major movements of British literature from Modernism through Postmodernism, including Conrad, Joyce, Woolf, Waugh, Amis, Drabble, Yeats, Eliot, Smith, Stoppard. 4 lectures. Prerequisite: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 338 Shakespeare in London (4) GEB C.3.

Readings from such works as Hamlet, King Lear, A Midsummer Night's Dream, and the sonnets. Attendance at performances of these plays in or near London. Not open to

students with credit in ENGL 339. 3 lectures, 1 activity. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 339 Introduction to Shakespeare (3) GEB C.3.

Readings from such works as Hamlet, King Lear, A Midsummer Night's Dream and the sonnets. 3 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 340 American Literature to 1860 (4) GEB C.3.

Selected prose and poetry by American writers to 1860, showing the Colonial foundation of our national literature, developments of the Enlightenment and achievements of the Romantic age. Representative writers include Bradstreet, Edwards, Franklin, Paine, Emerson, Poe, Hawthorne, Thoreau and Melville. 4 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 341 American Literature: 1860–1914 (4) GEB C.3.

Selected prose and poetry by American writers from the Civil War to World War I with the focus on local-color fiction and on literary Realism and Naturalism. Representative writers include Whitman, Dickinson, Twain, James, Howell, Chopin and Crane. 4 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 342 American Literature: 1914 to the Present (4) GEB C.3.

Selected prose, poetry and drama by American writers from World War I to the present, depicting the social and psychological complexities of the Twentieth Century. Representative authors include Frost, Eliot, Stevens, Fitzgerald, Hemingway, Faulkner and O'Neill. 4 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 345 Women Writers (4) GEB C.3.

Literature by women with attention to the woman artist and the creative process. Women writers and the dominant literary tradition with consideration of the existence of a women's literary tradition. Special emphasis upon the intersections of race, gender, and class as these intersections affect the creative process. 4 lectures. Prerequisite: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253, or consent of instructor.

ENGL 346 Ethnic American Literature (4) GEB C.3.

Literature by Black, Latino, Asian American and Native American writers. Historical contexts which affected these writers and the effect of marginalization on the creative process. Relationship of such writers to the American canon and a revised canon, discussion of the intersections of race, gender, and class as these intersections shape the creative process. 4 lectures. Prerequisite: ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253, or consent of instructor.

ENGL 350 Modern Novel (3) GEB C.3.

Readings in representative Twentieth Century novels with special emphasis on form and ideas. 3 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 351 Modern Poetry (3) GEB C.3.

Readings in representative Twentieth Century poetry with special emphasis on form and ideas. 3 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 352 Modern Drama (3) GEB C.3.

Readings in representative Twentieth Century drama with special emphasis on form and ideas. 3 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 353 Modern Drama in London (4) GEB C.3.

Readings in representative Twentieth Century drama with special emphasis on form and ideas. Attendance at play performances required. 3 lectures, 1 activity. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 355 The Bible as Literature (3)

Old and New Testaments with historical background. Literary forms and characteristics of Hebraic writing. Appreciation of the far-reaching use of Biblical narrative and reference in literature, speeches, art, drama, and modern film. 3 lectures. Prerequisite: ENGL 114 or equivalent or consent of instructor.

ENGL 360 Literature for Adolescents (3)

Readings in literature suitable for use in secondary schools. 3 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 362 Classics for Children and Youth (4)

Classic works of children's literature from the Eighteenth Century to the present. 4 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253, or consent of instructor.

ENGL 370 World Cinema (4) GEB C.3.

Major works of international cinema with emphasis on critical interpretation, on the ways film communicates visually and verbally, and on the historical and cultural contexts in which films are created. Contains films by directors such as Howard Hawks, Orson Welles, Ingmar Bergman and Akira Kurosawa. 3 lectures, 1 laboratory. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 372 Film Directors (4) GEB C.3.

Significant film directors from the Western world and non-Western world, and their cinematic and technical achievements. Demonstrates relationships of Twentieth Century modes of thought. *Class Schedule* will list topic selected. Total credit limited to 12 units. 3 lectures, 1 laboratory. Prerequisite: ENGL 114 and ENGL 230, ENGL

231, ENGL 240, ENGL 251, ENGL 252, ENGL 253, or consent of instructor.

ENGL 380 Contemporary Literary Ideas (4) GEB C.3.

Literature of the modern period. Significant writers, both from the Western world and the non-Western world, and their literary achievements. Demonstrates relationships of prevailing Twentieth Century modes of thought. *Class Schedule* will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: ENGL 114 and ENGL 230, ENGL 231, ENGL 240, ENGL 251, ENGL 252, ENGL 253 or consent of instructor.

ENGL 385 Mass Media Criticism (4) (Also listed as JOUR 385 and SPC 385)

Examines mass media (especially broadcasting) from a rhetorical/critical perspective. Aims to expand students' understanding of media issues, media's role as critic, and the role of criticism. 4 lectures. Prerequisite: SPC 201 or SPC 202.

ENGL 390 Modern English Grammar (4)

Linguistic analysis of the English language. Phonology, morphology, and syntax. Traditional, descriptive-structural, and transformational-generative grammars. 4 lectures. Prerequisite: ENGL 114 or equivalent.

ENGL 391 Topics in Applied Linguistics (4)

Issues in applied linguistics including sociolinguistics, first and second language acquisition, literacy, bilingualism, and dialectology. Applications to teaching the English language. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

ENGL 395 History of the English Language (4)

Development of the English language from its origins to its present forms and practices. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

ENGL 399 Tutor Training (2) (CR/NC)

Studies of approaches tutoring one-on-one. Practice in tutoring, with supervision, in the University Writing Lab. Two hours of lecture per week which reviews the special needs of ESL, dialect-different, dyslexic, and remedial students. Overview of Writing Lab administration and design. Repeatable. Non-baccalaureate credit. Credit/No Credit grading only. 1 lecture, 1 laboratory. Prerequisite: ENGL 114, ENGL 215, ENGL 302.

ENGL 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

ENGL 415 Advanced Creative Writing (4)

Instruction and practice in advanced writing, revising and evaluating of fiction or poetry. Total credit limited to 8 units. 4 lectures. Prerequisite: ENGL 325 or consent of instructor. ENGL 325 (Fiction) must be taken as prerequisite to ENGL 415 (Fiction).

ENGL 418 Technical Communication Practicum (2-4) (CR/NC)

Supervised work experience in government, corporate, or volunteer setting, as approved by department head. Placement may be student or employer initiated, or through Cooperative Education. Proposal, progress reports, and final report. Total credit limited to 8 units, with a maximum of 4 units per quarter. Credit/No Credit grading only. Prerequisite: Senior standing, two technical writing courses.

ENGL 421 Writing in Secondary Schools (4)

Approaches to writing in secondary schools. Overview of composition theory and examination of current research on the teaching of writing. Exploration of classroom techniques appropriate to student needs and program goals. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

ENGL 424 Organizing and Teaching English (4)

Introduction to the organization, selection, presentation, application, and interpretation of subject matter in English in secondary schools. 4 lectures. Prerequisite: Admission to teacher education program or valid teaching credential.

ENGL 430 Chaucer (4)

Selected readings from *Canterbury Tales* and Chaucer's other major poems. 4 seminars. Prerequisite: ENGL 330, or ENGL 331, or ENGL 332, or ENGL 333, or ENGL 334.

ENGL 431 Shakespeare (4)

Representative comedies, tragedies, and histories. 4 seminars. Prerequisite: ENGL 330, or ENGL 331, or ENGL 332, or ENGL 333, or ENGL 334, or ENGL 339.

ENGL 432 Milton (4)

Paradise Lost, *Paradise Regained*, and *Samson Agonistes*, with some attention to the minor poems. 4 seminars. Prerequisite: ENGL 330, or ENGL 331, or ENGL 332, or ENGL 333, or ENGL 334.

ENGL 439 Significant British Writers (4)

Selected British writers, as individual writers or in groups. Each course will have a subtitle descriptive of the content. Total credit limited to 8 units. 4 seminars. Prerequisite: ENGL 330, or ENGL 331, or ENGL 332, or ENGL 333, or ENGL 334.

ENGL 449 Significant American Writers (4)

Selected American writers, as individual writers or in groups. Each course will have a subtitle descriptive of the content. Total credit limited to 8 units. 4 seminars. Prerequisite: ENGL 340, or ENGL 341, or ENGL 342.

ENGL 459 Significant World Writers (4)

Selected world writers, as individual writers or in groups. Each course will have a subtitle descriptive of the content. Total credit limited to 8 units. 4 seminars. Prerequisite: 8 units of literature or consent of instructor.

ENGL 460 Senior Project Seminar (1)

Discussion of selected subjects such as Renaissance Drama, comedy or tragedy, creative writing, and the like, for purposes of defining individual topics for completion in ENGL 461. 1 seminar. To be taken concurrently with ENGL 461. Prerequisite: English department approval.

ENGL 461 Senior Project (3)

Selection and completion of a project under faculty supervision. Projects typify problems which a graduate may face in his field of employment. Project results are presented in a formal written report. Minimum of 90 hours total time. Prerequisite: Prior consent of instructor.

ENGL 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. Class schedule will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ENGL 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

ENGL 495 Applied Language Study (4)

Linguistic theory applied to human communications, human relations, and literature. Each course will have a subtitle descriptive of the content. Total credit limited to 8 units. 4 seminars. Prerequisite: ENGL 390 or consent of instructor.

ENGL 496 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

ENGL 497 Theories of Language Learning and Teaching (4)

Theories of first and second language learning and acquisition in the context of teaching English as a second language/dialect. 4 lectures. Prerequisite: Eight units of linguistics or consent of instructor.

ENGL 498 Approaches to Teaching English as a Second Language/Dialect (4)

Approaches to teaching English to second language and second dialect students. Attention to materials development and testing. Practicum allows for experience within the ESL classroom. 4 lectures. Prerequisite: ENGL 497.

ENGL 499 Practicum in Teaching English as a Second Language/Dialect (2) (CR/NC)

Practical experience in the English as a Second Language/Dialect classroom under the supervision of a cooperating teacher. Teaching materials development, and curriculum design. Credit/No Credit grading only. 1 seminar, and supervision. Prerequisites: ENGL 497 and ENGL 498.

ENGL 501 Techniques of Literary Research (4) (CR/NC)

Purposes and methods of literary research in literature. Acquaintance with printed materials of research and practical experience in collecting material, weighing evidence, reaching conclusions, and writing scholarly articles. Analysis of dissemination of scholarly information. Discussion of

ethics of scholarship. Credit/No Credit grading only. 4 seminars. Prerequisite: Graduate standing.

ENGL 502 Seminar in Critical Analysis (4)

Basic approaches used by critics. Multiple points of view. Application to literary works. *Class Schedule* will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing.

ENGL 503 Seminar in English Linguistics (4)

Current modes of linguistic study and their application to English grammar. *Class Schedule* will list topic selected. 4 seminars. May be repeated to 12 units. Prerequisite: ENGL 290, ENGL 390 or consent of instructor.

ENGL 504 Seminar in Applied English Linguistics (4)

Consideration of applications of linguistics to literature, dialectology, language acquisition, literacy, bilingualism, or discourse analysis. *Class Schedule* will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: ENGL 290, ENGL 390, or ENGL 503, or equivalent, or consent of instructor.

ENGL 505 Seminar in Composition Theory (4)

Special problems in composition. Direct application of new language information to composition or detailed analysis of relationship between rhetorical principles and writing. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in English.

ENGL 506 Pedagogical Approaches to Composition (4) (CR/NC)

Practical problems in the teaching of English composition. Application and study of practical approaches. Discussion of day to day experiences in the classroom. Discussion of and research into the nature and solution of student writing problems. Required of all new teaching assistants in English. Total credit limited to 8 units. Credit/No Credit grading only. 4 seminars. Prerequisite: Graduate standing in English.

ENGL 510 Seminar in Authors (4)

Intensive study of major British and American literary figures, singly, doubly or in small groups. Written and oral reports of individual investigation. *Class Schedule* will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing, completion of or concurrent enrollment in ENGL 501.

ENGL 511 Seminar in American Literary Periods (4)

American periods. Written and oral reports of individual investigation. *Class Schedule* will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing in English, completion of or concurrent enrollment in ENGL 501.

ENGL 512 Seminar in British Literary Periods (4)

British periods. Written and oral reports of individual investigation. *Class Schedule* will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing, completion of or concurrent enrollment in ENGL 501.

ENGL 513 Seminar in Special Topics (4)

Themes and ideas in language and literature not ordinarily covered in the routine graduate course offerings. Written and

oral reports of individual investigation. *Class Schedule* will list topic selected. Total credit limited to 12 units. 4 seminars. Prerequisite: Graduate standing, completion of or concurrent enrollment in ENGL 501.

ENGL 515 Apprenticeship in Teaching Literature or Linguistics at College Level (2) (CR/NC)

Supervised experience in planning, teaching, and evaluating a 200- or 300-level linguistics or literature class taught by English faculty member. Planning, selecting texts, conferring with students, discussing and constructing assignments, lecturing, leading small group discussions. Credit/No Credit grading only. Prerequisite: ENGL 506 and successful teaching experience in ENGL 114 or ENGL 215.

ENGL 518 Technical Communication Theory (4)

Theory of technical communication for teachers, managers, advanced writers, and editors. Applications to science, agriculture, engineering. Evolving concepts and uses of literacy in a technological age: e.g., readability, information retrieval, document design. 4 seminars. Prerequisite: ENGL 318 or equivalent or consent of instructor.

ENGL 520 Problems in Secondary English (3)

Topical issues in teaching secondary school English. Designed especially for credentialed teachers in the field. Alternate topics like the following: writing instruction workshop, teaching masterworks and young adult literature, implications of rhetorical and discourse theories, computer technology in English, literary criticism and teaching, research in reading and writing. Written reports of topic investigations. Total credit limited to 9 units. 3 seminars. Prerequisite: Graduate standing in English.

ENGL 590 Directed Study (2-4)

Supervised independent or group study of special problems in selected areas of language, composition, or literature. Total credit limited to 12 units. Prerequisite: Graduate standing in English.

ENGR-ENGINEERING

ENGR 110 Engineering Science I (3)

Introduction to engineering and computer science. Graphical communication and visualization as well as engineering orientation. Cultural pluralism and gender issues. 3 lectures.

ENGR 111 Engineering Science II (3)

Introduction to engineering and computer science. Computer-aided design (CAD) and manufacturing (CAM), and fabrication, as well as engineering orientation. Cultural pluralism and gender issues. 3 lectures.

ENGR 112 Engineering Science III (3)

Introduction to engineering and computer science. Computer science and engineering orientation. Cultural pluralism and gender issues. 3 lectures.

ENGR 141 Engineering Orientation-Freshman Seminar (2) (CR/NC)

College success skills for the technical student, including group study, time management, technical project, identification of campus resources. Academic, career and personal assessment as it relates to the educational process.

Specifically for students enrolled through Student Academic Services and the Minority Engineering Program. Credit/No Credit grading only. 1 lecture, 1 activity.

ENGR 142 Engineering Careers (2) (CR/NC)

Career investigation, resume writing, job search and interview skills, speakers from industry and time management. Specifically for students enrolled through Student Academic Services and the Minority Engineering Program. Credit/No Credit grading only. 1 lecture, 1 activity.

ENGR 301 Technology in the 20th Century (3) GEB F.2.

Role of science, engineering and technology in the Twentieth Century. Effects of technological change, the function of the scientist-engineer in society. Computer as a tool, case studies of systems to compare alternative approaches to problem solving. 3 lectures. Prerequisite: Junior standing or consent of instructor.

ENGR 303 Professional Development (2) (CR/NC)

Integration of principles of Engineering with industrial realities via professional problem solving modules. Research and field investigation at cooperating industry sites. Advanced learning systems. Specifically designed for transfer students. Credit/No Credit grading only. 2 lectures. Prerequisite: Junior standing or consent of instructor.

ENGR 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

ENGR 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

ENGR 581 Biochemical Engineering I (4)

Fundamentals of Biotechnology. Types of organisms and their structure. Unstructured and structured models for microbial growth. Theory of microbial competition. Stoichiometric and thermodynamic principles. Material and energy balances for aerobic and anaerobic growth. Kinetics of enzyme catalyzed reactions. 3 seminars, 1 laboratory. Prerequisite: BACT 221 and CHEM 371, or consent of instructor.

ENGR 582 Biochemical Engineering II (4)

Kinetics of growth, product formation and cell death. Continuous culture. Cell recycle and immobilization. Air sterilization. Transport processes in bioreactors. Scale-up of bioprocesses. Biochemical processes. Biocatalysis. Recombinant DNA and non-microbial processes. 3 seminars, 1 laboratory. Prerequisite: ENGR 581 or consent of instructor.

ENGR 583 Biochemical Engineering III (4)

Biochemical separations. Biological materials. Removal of insoluble-centrifugation, filtration, cell disruption. Primary product isolation: extraction, ultrafiltration, adsorption, ion exchange, fixed and fluidized bed operation. Production purification: gel filtration, affinity chromatography, salt fractionation. Final isolation: drying, crystallization. Quality control. 3 seminars, 1 laboratory. Prerequisite: ENGR 582 or consent of instructor.

ENGR 585 Cooperative Education Experience (6) (CR/NC)

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

ENGR 595 Cooperative Education Experience (12) (CR/NC)

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

ENGR 599 Design Project (Thesis) (2) (2) (5)

Each individual or group will select, with faculty guidance and approval, a topic for independent research or investigation resulting in a thesis or project to be used to satisfy the degree requirement. An appropriate experimental or analytical thesis or project may be accepted. Prerequisite: Graduate standing.

ENVE-ENVIRONMENTAL ENGINEERING**ENVE 200 Special Problems for Undergraduates (1-2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

ENVE 304 Thermodynamics of Processes (3)

Material balances, energy balances, liquids and mixtures, vapor-liquid equilibria, solubility and absorption, equilibrium in chemical reactions. 3 lectures. Prerequisite: ME 302, CHEM 125.

ENVE 309 Noise and Vibration Control (3)

Behavior of sound waves, selection of instrumentation, practical measurements, criteria for noise and vibration control. Assessment of noise produced by transportation and other engineering facilities. 2 lectures, 1 laboratory. Prerequisite: CE 112, MATH 241, PHYS 133, and CSC 204 or CSC 251.

ENVE 316 Automatic Process Control (2)

Introduction to automatic control instrumentation. Methods of analysis of control systems. Analytical determination of

control response. 2 lectures. Prerequisite: MATH 242, ME 302, ME 313, ME 341.

ENVE 324 Introduction to Air Pollution (3) GEB F.2.

Causes and effects of air pollution on the individual, the community and industry. Legal and economic aspects. For non-majors. 3 lectures. Prerequisite: Junior standing.

ENVE 325 Environmental Air Quality (3)

Consideration of ambient air contamination inside and outside. Factors included in establishing, monitoring and maintaining air quality standards. 3 lectures. Prerequisite: CHEM 125.

ENVE 330 Environmental Quality Control (3) GEB F.2.

Application of scientific and engineering principles to control the development and use of air, water and land resources. Control of pollution of the environment. Disposal of wastes. Administrative and legal aspects. For non-Engineering majors. 3 lectures. Prerequisite: Junior standing.

ENVE 331 Introduction to Environmental Engineering (3)

Application of scientific, engineering, and economic principles to development and control of environmental problems. Mathematical modeling of environmental systems. Environmental interactions between air, soil, and water. Legal and administrative aspects. 3 lectures. Prerequisite: MATH 242, CHEM 125, ME 341.

ENVE 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

ENVE 411 Air Pollution Control (3)

Theory, principles and practices related to the control of particulate emissions. Mechanical separations. Cost and design of control systems. 3 lectures. Prerequisite: ENVE 325 or ENVE 331 and senior standing.

ENVE 421 Mass Transfer Operations (3)

Theory and practices related to using mass transfer principles to solve environmental problems. Design principles dealing with air and water pollution control and hazardous waste management. Computer simulation. 3 lectures. Prerequisite: ENVE 325, ME 313, ME 341.

ENVE 426 Air Quality Measurements (3)

Planning and conducting air quality measurements in the atmosphere, indoors and at the source. Topics include both particulates, gases and meteorological measurements. 2 lectures, 1 laboratory. Prerequisite: ENVE 325, CHEM 326.

ENVE 434 Water Quality Measurements (2)

Methods employed in the qualitative and quantitative determination of water and waste water constituents. Physical, chemical and biological procedures used in determining water quality. Testing of effluents from industrial and municipal treatment plants. 1 lecture, 1 laboratory. Prerequisites: CHEM 129, CHEM 326.

ENVE 436 Introduction to Hazardous Waste Management (3)

Overview of industrial processes which produce hazardous wastes. Principles of toxicology and review of state federal regulations for hazardous wastes, including RCRA, TSCA, and superfund laws. Storage, handling, and transport of hazardous wastes. Unit operations and processes treatment and reduction. Ultimate disposal including incineration and secure landfills. 3 lectures. Prerequisite: ENVE 325 or ENVE 331 and senior standing.

ENVE 438 Water and Wastewater Treatment Design (3)

Design of facilities for physical and chemical treatment of water and wastewater, biological treatment of wastewater, and treatment and disposal of sludge. Design of land treatment systems and septic tanks. Use of computers for design problems. 3 lectures. Prerequisite: ENVE 331.

ENVE 439 Solid Waste Management (3)

Chemical and physical properties of municipal and industrial refuse. Landfill disposal, incineration, composting. Industrial and commercial solid waste disposal problems and treatment methods. Pyrolysis. Salvage and recycle operations. Economics of disposal methods. Interrelationship between water quality and landfill operations. 2 lectures, 1 laboratory. Prerequisite: Senior standing.

ENVE 442 Advanced System Design (3)

Individual and team project work in designing environmental systems including air and water pollution control, solid waste disposal and hazardous waste management. 1 lecture, 2 laboratories. Prerequisite: ENVE 411, and ME 456.

ENVE 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. Prerequisite: Senior standing.

ENVE 465 Environmental Management and Urban Systems (2)

Interdisciplinary study of urban pollution sources and control. Political, economic, and technological interrelationships. Participation in METRO-APEX, assuming roles of several urban decision makers. 1 lecture, 1 activity. Prerequisite: Senior standing.

ENVE 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

ENVE 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 laboratories. Prerequisite: Consent of instructor.

ENVE 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid

and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 16 units. Prerequisite: Sophomore standing and consent of instructor.

ENVE 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Credit/No Credit grading only. Total credit limited to 16 units. Prerequisite: Sophomore standing and consent of instructor.

ENVE 500 Individual Study (1–3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Total credit limited to 4 units. Prerequisite: Graduate standing and consent of department head.

ENVE 534 Advanced Design of Pollution Control Systems (3)

Comprehensive problems in pollution control. Methods of analysis, design of unit operations and processes for environmental engineering facilities. 1 seminar, 2 laboratories. Prerequisite: ENVE 411, and graduate standing.

ENVE 535 Advanced Wastewater Treatment (3)

Operations and processes used in tertiary treatment. Chemical coagulation, flocculation, sedimentation, filtration, absorption. Methods for removal of phosphorous, nitrogen, solids and organics. Integration of advanced wastewater treatment processes. 3 seminars. Prerequisite: Graduate standing.

ENVE 536 Biological Wastewater Treatment Processes Engineering (3)

Fundamentals of reactor engineering. Biochemical and microbiological background. Modeling and design of biochemical reactors. 3 lectures. Prerequisite: Graduate standing.

ENVE 541 Resource and Energy Recovery (3)

In-depth evaluation of physical and biological processes for the recovery of resources and energy from solid waste. Preparation of an engineering design report. Use of computer models for process engineering and cost estimation of resource recovery facilities. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

ENVE 551 Environmental Unit Operations (4)

In-depth laboratory study of unit operations and processes used in environmental engineering. Performance tests on laboratory scale equipment. Computer simulations. 2 lectures, 2 laboratories. Prerequisite: ENVE 421 and graduate standing.

ENVE 570 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 seminars. Prerequisite: Graduate standing or consent of instructor.

ENVE 571 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 laboratories. Prerequisite: Consent of instructor.

ENVE 599 Design Project (Thesis) (2) (2) (5)

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis. Prerequisite: Graduate standing.

ES–ETHNIC STUDIES**ES 110 Introduction to Ethnic Studies (3)**

Introduction to comparative approaches involved in the interdisciplinary study of United States and international ethnic groups, and how they relate to linguistic, institutional, gender and racial struggles of influence and power.

ES 114 Racism in American Culture (3)

Survey and analysis of racism in the development of American institutions and its effect upon ethnic groups, women, and society. 3 lectures.

ES 200 Special Problems for Undergraduates (1–3)

Supervised investigation, including a written report, of a topic chosen with prior approval of instructor. Total credit limited to 6 units, with a maximum of 3 units per quarter. Prerequisite: Consent of department chair.

ES 210 United States Cultural Heritage (3)

History and culture of selected ethnic groups (American Indian, Asian American, African American, Latino/Chicano/a), their comparative roles in and contributions to the American cultural heritage and to the processes and struggles for ethnic and gender equality. 3 lectures.

ES 230 Chicano/a Literature (3)

Overview of contemporary Chicano and Chicana literary production since 1848. Thematic concerns and literary techniques that appear in poetry, short stories, novels and drama of Chicano/a writers. Historical and socio-economic factors that have shaped Chicano and Chicana fiction. Aztlán as an ancient myth and contemporary metaphor. 3 lectures.

ES 320 American Cultural Images (3)

Comparative study of stereotypical and archetypal impressions, images, and projections of American cultural/ethnic minority/majority groups in American popular opinion and consciousness, with emphasis on African Americans, American Indians, Asian Americans, and Mexican Americans/Latinos. See *Class Schedule* for group selected. 3 lectures. Prerequisite: ES 110.

ES 325 African American Women's Experiences (3)

Examination of the experiences of African American women, from their arrival in the United States through contemporary times. Ordinary as well as extraordinary Black women and their lives will occupy the center of inquiry, with the following themes in mind: economics, gender roles, race and socio-political movements. Experiences of African American females as both integral to and a unique aspect of the past, present and future of the United States. 3 lectures. Prerequisite: ES 110.

ES 350 Asian American and African American Environments (3)

Historical and cultural factors shaping various Asian American and African American environments, emphasizing the understanding of the physical settings in relation to the intentions and social situations of these different groups. 3 lectures. Prerequisite: ENGL 114, POLS 210, HIST 204, junior standing.

ES 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

ET–ENGINEERING TECHNOLOGY**ET 200 Special Problems for Undergraduates (1–2)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

ET 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation of techniques, studies or laboratory application of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

ET 461, 462 Senior Project (2) (3)

Selection and completion of a project under faculty supervision. Projects are typical of problems graduates must solve in their fields of employment. Project results are presented in a formal report. Miscellaneous course fee required—see *Class Schedule*. Minimum 150 hours total time. Prerequisite: Senior standing and consent of instructor.

ETME–ENGINEERING TECHNOLOGY–MECHANICAL**ETME 131 Introduction to Engineering Drawing (2)**

Basic instruction in drafting methods, techniques and use of equipment. Geometric constructions. Principles and practices of isometric, oblique, and multiview drawing systems. 1 lecture, 1 laboratory.

ETME 141 Applied Descriptive Geometry (2)

Computer-aided solutions of problems involving geometry in three-dimensional space by method of multiview projection.

View structure in CAD. Intersections and development of geometric solids. Application to engineering design. 1 lecture, 1 laboratory. Prerequisite: High school drafting or ETME 131.

ETME 142 Engineering Drawing I (1)

Advanced principles and methods of multiview and pictorial drawing. Conventional industrial drafting practices including sectioning and dimensioning techniques. Auxiliary views. Threads and fasteners. Dimensioning and tolerancing. Surface finishes. Drawing reproduction processes. 1 laboratory. Prerequisite: ETME 131 or recent high school drafting.

ETME 143 Engineering Drawing II (1)

Drawings of mechanical components; layout, details, and assemblies. Selection of views, scales, dimensions, symbols and notes. Engineering change systems. Introductory geometric tolerancing. Computer-aided drafting utilizing the CRT, keyboard, and light pen/ditizer. Introduction to view structure. 1 laboratory. Prerequisite: ETME 142.

ETME 205 Statics for Engineering Technology (3)

Statics by scalar methods. Includes forces, couples, resultants, equilibrium, trusses, cables, friction, centroids, and moments of inertia. 3 lectures. Prerequisite: CSC 110, MATH 132, PHYS 121.

ETME 206 Dynamics for Engineering Technology (4)

Dynamics by scalar methods. Includes kinematics (both absolute and relative motion of particles and bodies) and kinetics, force, mass, acceleration, work and energy, impulse and momentum, and fundamentals of vibrations. 4 lectures. Prerequisite: ETME 205.

ETME 301 Thermodynamics for Engineering Technology (3)

Fundamental concepts of work, heat, and energy. First and second laws of thermodynamics. Properties of ideal gases and vapors, combustion, vapor and gas power cycles. 3 lectures. Prerequisite: PHYS 122, CHEM 121, MATH 132.

ETME 302 Heat Transfer for Engineering Technology (3)

Modes of heat transfer. Fluid mechanics principles for heat transfer. Steady state conduction, radiation, convection. Applications in heat absorption and heat exchangers. 3 lectures. Prerequisite: CHEM 121, MATH 132, PHYS 122.

ETME 311 Fluid Mechanics for Engineering Technology (3)

Principles that underlie the flow of various fluids. Fluid statics, kinematics of fluid flow, viscosity and fluid friction. Incompressible flow in pipes and open channels, flow measurement, fluid machinery and lubrication. 3 lectures. Prerequisite: PHYS 122, ETME 206.

ETME 333 Industrial Hydraulics and Pneumatics (4)

Basic principles of hydraulics and pneumatics. Characteristics and performance of various hydraulic and pneumatic components such as pumps, compressors, cylinders, motors, valves, accumulators, lines, fittings, filters, etc. Hydraulic fluids. Component selection and circuit layout using American National Standard graphic symbols. 3 lectures, 1 laboratory. Prerequisite: ETME 311 or consent of instructor, ENGL 218.

ETME 337 Instrumentation of Mechanical Systems (3)

Principles of process instrumentation and control. Temperature, pressure, flow and level measurement. Analytical instrumentation. Pneumatic and electric transmission devices and controllers. Signal conditioning. Recorders and indicators. 2 lectures, 1 laboratory. Prerequisite: EET 125, ETME 311, ENGL 218.

ETME 338 Industrial Engines (4)

Types of power plants and their application to vehicles and stationary plant generators, compressors, and other industrial equipment. Includes various types of engines, turbines, boilers and some of the newer developments being applied in industry. Fuel conservation and pollution control. 3 lectures, 1 laboratory. Prerequisite: ETME 301, ETME 337, ENGL 218.

ETWT-ENGINEERING TECHNOLOGY-WELDING TECHNOLOGY

ETWT 335 Nondestructive Evaluation (3)

Theory and application of nondestructive evaluation systems for quality control. Includes radiography, ultrasonic, magnetic particle, penetrants, and eddy current. 2 lectures, 1 laboratory. Prerequisite: ENGL 218, PHYS 123, junior standing.

FIN-FINANCIAL MANAGEMENT

FIN 330 Real Estate Principles (4)

Introduction to the field of real estate providing a basic background for further study. Includes legal aspects, financing, valuation, economics, public control, title insurance and escrow, closing, safeguards for the buyer. Investment and leasing. 4 lectures. Prerequisite: BUS 201 or BUS 207. Junior standing required.

FIN 342 Financial Management (4)

Theory and applications of financing business operations. Financial management of current and fixed assets from internal and external sources. Analysis, planning, control, and problem solving. 4 lectures. Prerequisite: ECON 222, MATH 221, STAT 252. ACTG 301 recommended. Junior standing required.

FIN 411 Security Analysis and Portfolio Management (4)

Analysis of securities, markets, and valuation. Security price movements related to money and capital market factors and corporate events. Portfolio planning, risk, media, and objectives of individual and institutional investors. 4 lectures. Prerequisite: FIN 342.

FIN 412 Law of Real Property (4)

Legal problems of acquisition, ownership and transfer of real property. Contracts, agency, estates, and co-ownership, mortgages and deeds, covenants, conditions, and restrictions, easements, landlord-tenant, and zoning. 4 lectures.

FIN 430 International Business Finance (4)

Financial management of international business. International capital and money markets, international financial

institutions, special problems in evaluating direct foreign investment, and financial techniques used in international business operations. 4 lectures. Prerequisite: FIN 342.

FIN 432 Real Estate Finance (4)

Analysis of the relationship between national and local money markets. Real estate financing techniques, sources of funds, government participation, legal instruments of finance. 4 lectures. Prerequisite: FIN 342. FIN 330 recommended.

FIN 434 Real Estate Investment (4)

Effects of federal, state and local taxes on investment transactions. Intensive investigation and computer analysis of urban investment opportunities. Problems in exchanging and property management. 4 lectures. Prerequisite: FIN 342. Recommended: FIN 432.

FIN 440 Commercial Bank Management (4)

Analysis of the management of a commercial bank as a profit-making entity. Emphasis put on cases in bank management, especially those which deal with the management of a bank's asset and liability structure. 4 lectures. Prerequisite: Senior standing, FIN 342, and ECON 337.

FIN 466 Computer Applications in Finance (4)

A combination lecture/computer lab course focusing on computer acquisition of financial data and the subsequent application of financial theory and analysis to this data so as to facilitate financial decision making. 3 lectures, 1 activity. Prerequisite: FIN 342 and MIS 321.

FIN 480 Advanced Seminar in Investment (4)

Current topics in investments. An in-depth analysis of the efficient markets hypothesis and capital market theory. 4 seminars. Prerequisite: FIN 411.

FIN 489 Case Studies in Finance (4)

Development of analytical and decision-making techniques in applying financial theory to business management problems. Emphasizes working capital management, financial analysis and forecasting, mergers and acquisitions, and other current topics in finance, including financial ethics. Cases are used to emphasize practical problems. 4 lectures. Prerequisite: FIN 342, ACTG 321, and FIN 411.

FNR-FORESTRY AND NATURAL RESOURCES

FNR 101 Natural Resources Management and Society (3)

GEB F.2.

Integrated development, utilization and management of the nation's and world's natural resources for the continuous benefit of humankind and the conservation of the resources. Discussion of natural resources management practices and technologies which may provide a more flexible range of societal benefits for the wise use of our natural resources. 3 lectures.

FNR 112 Parks and Outdoor Recreation (3)

Introduction to national, state, county, city and private park systems. History, philosophy, policy and principles of the formation, administration and functioning of wildland

recreational units at the park, county, regional, national, and international levels. 3 lectures.

FNR 140 Career Development and Planning in Natural Resources Management (1) (CR/NC)

Analysis and development of career goals in natural resources. Acquainting students with potential career options and assisting them in planning and implementation phases of an academic career program at Cal Poly. Credit/No Credit grading. 1 activity. Prerequisite: Consent of instructor.

FNR 201 Forest Resources (3)

GEB F.2.

Fundamentals of forestry including basic silviculture, forest protection, measurement and policy. Integrated resource management of forest lands for water production, forage, recreation, wildlife, and timber. 3 lectures.

FNR 202 Environmental Management (3)

GEB F.2.

Environmental management as a process within functioning societies seeking a harmonious balance between human activities and intrinsic behavior of the natural environment. Major components of the natural environment and the political and social activities that impact that environment. 3 lectures.

FNR 203 Resource Law Enforcement (3)

Law enforcement applied to natural resource conservation on public and private lands. Examination of state and federal laws related to fish and wildlife management. Problems associated with implementation of resource laws examined. 3 lectures.

FNR 204 Resource Fire Control (2)

Basic fire control techniques used on various wildland fuels. Elementary fire physics, fuels, weather, fire behavior, line construction, mop-up, fire line safety, and fire organization. Meets basic fire fighter certification requirements for U.S. Forest Service and California Department of Forestry and Fire Protection. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 1 laboratory.

FNR 208 Dendrology (4)

Identification, classification, silvical characteristics, distribution, environmental requirements and economic importance of trees and shrubs in parks, forest and wildlife areas of the United States. Emphasis on Pacific Coast species. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: BOT 223.

FNR 220 Forest Resources Enterprise Project (1-4) (CR/NC)

Selection and completion of a forest management/production project under faculty supervision. Project participation is voluntary and subject to approval by the department head and the Cal Poly Foundation. Degree credit limited to 8 units. Credit/No Credit grading only. Prerequisite: FNR 201 or equivalent.

FNR 250 Survey and Management of Mediterranean Ecosystems (2)

Woody vegetation found in worldwide Mediterranean ecosystems. Distribution, historical development and use of these ecosystems. Fire influences and fire management

problems. Animal use and other management problems. 2 lectures.

FNR 290 Intercollegiate Forestry Activities (1) (CR–NC)

Beginning through advanced skills in the event areas of college forestry activities. Instruction in use of specialized equipment and safety. Minimum of 4 hours of laboratory per week. Total credit limited to 8 units. Credit/No Credit grading only. Prerequisite: Enrollment limited to those qualified to compete in intercollegiate forestry activities and consent of instructor.

FNR 300 Computer Applications in Resource Management (2)

Resource management applications of microcomputers. Software programs include forest and natural resource management planning, forecasting, analysis of systems, and resource data base management for multiple use objectives. Forestry and natural resource examples will be used. 1 lecture, 1 laboratory. Prerequisite: AG 250 or CSC 113, junior standing or consent of instructor.

FNR 302 Natural Resources Policy (3)

Historical development and significance of natural resource policies. Policy process approach to understanding the efforts to resolve natural resource problems in the public and private sector. 2 lectures, 1 laboratory. Prerequisite: FNR 112, FNR 201.

FNR 303 Forest Protection (5)

Impact and losses to forested areas caused by physical and biotic agents (such as insects and diseases) other than fire; relation of direct and indirect control practices to forest management. Saturday field trips required. 4 lectures, 1 laboratory. Prerequisite: FNR 304 or consent of instructor.

FNR 304 Ecology of Resource Areas (4)

Resource ecology and management implications in the major ecosystems of North America. Importance of maintaining the natural dynamics of energy flow and nutrient cycles at the community and ecosystem level for the benefit of man. Humanity's role as a principal factor of change of the resources in natural systems. 3 lectures, 1 laboratory. Prerequisite: One course in biological sciences.

FNR 305 Forest Harvesting (3)

Relationships between forest production and harvesting methods, preparation of timber harvest plans, site preparation, harvesting effects, and cost analysis of harvesting methods. Overnight field trips are required to visit timber operations. Miscellaneous course fee required—see *Class Schedule*. 3 lectures and required field trip. Prerequisite: Junior standing or consent of instructor.

FNR 311 Environmental Interpretation (4)

Interpretation of the biological, physical and aesthetic values of the natural elements of our environment; organization and presentation of interpretive materials by oral, written, and display methods of communication. 3 lectures, 1 laboratory. Prerequisite: SPC 201 or SPC 202.

FNR 314 Forest Mensuration (5)

Methods and principles of measurement for contents of trees, stands and felled timber. Construction and use of volume tables. Application of statistical measures, sampling and

inventory techniques. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 2 laboratories. Weekend field trips required. Prerequisite: MATH 120 or equivalent, STAT 212, and AE 237.

FNR 316 Growth and Yield (3)

Site, growth and current and future yield prediction; techniques of growth determination for plantations, even-aged and all-aged forests. Use of models such as CRYPTOS. Volume from logs. Growth response to stand treatments. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Saturday field trips required. Prerequisite: FNR 314.

FNR 318 Applications of GIS in Natural Resources (2) (Also listed as LA 318)

ARC/INFO Geographic Information System (GIS) computer software to explore relevant environmental issues utilizing natural resources data such as vegetation, soils, habitats, topography and geology. Develop data base, use software and apply to relevant, natural systems. Miscellaneous course fee required—see *Class Schedule*. 2 laboratories. Prerequisite: Junior standing, and AG 250 or CSC 113 or consent of instructor.

FNR 325 Woodlot and Christmas Tree Management (3)

Management of farm woodlots and small forest holdings. Measurement, care and improvement of existing woodlots. Establishment of new woodlands. Woodland management design and plans for fuel and other products, including Christmas tree operations. Integration with range, wildlife and recreation values. Weekend or full-day field trips required. 2 lectures, 1 laboratory. Prerequisite: FNR 201, FNR 208, FNR 314 or consent of instructor.

FNR 332 Forest Products (4)

Manufacturing and marketing of wood products, wood identification, study of wood structure and mechanical properties. Weekend or full-day field trip required. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: FNR 201, FNR 208, PHYS 104, or consent of instructor.

FNR 333 Hardwood Management (3)

Hardwood forest types, their historical development, management, protection, measurement, and utilization. Discussion of land use conflicts among public resource agencies, private companies, landowners, and governments representing views of ranchers, wildlife managers, foresters, environmental groups, recreation, etc. 2 lectures, 1 laboratory. Prerequisite: FNR 208 or consent of instructor.

FNR 339 Internship in Forest and Natural Resources (1–12) (CR/NC)

Selected students will spend up to 12 weeks with an approved firm or agency engaged in forest or natural resources management. Applying and developing managerial skills and abilities. One unit of credit may be allowed for each full week of completed and reported internship. Credit/No Credit grading. Prerequisite: Consent of instructor.

FNR 340 Resource Fire Management (2)

Wildland fuels, fire weather, fire behavior, and fire danger ratings in the chaparral, grassland, and wooded areas of forests, parks, and wildlands. Management implications,

policy and objectives of fire management organizations. Saturday field trips may be required. 2 lectures. Prerequisite: FNR 204 or consent of instructor.

FNR 342 Fire Ecology (3)

Effects of wildland fires on shrub, woodland, and forest environments to include fuels, plants, soil, water, wildlife, and air. Emphasis is on western U.S., worldwide forest and shrub ecosystem. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: FNR 304 or ecology course, and FNR 204 or consent of instructor.

FNR 345 Chaparral Management (3)

Chaparral community management techniques, management alternatives and the effects of management on fire, water production, erosion and potential utilization of the biomass. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: FNR 304 or consent of instructor.

FNR 350 Urban Forestry (3)

Establishment and management of city forests, small forest holdings, shelter belts, and plantings for erosion control, wildlife enhancement, and pollution abatement. Management of forest areas requiring special attention because of heavy recreational use, fire hazard, watershed, and societal values. Weekend or full-day field trips required. 2 lectures, 1 laboratory. Prerequisite: FNR 208, FNR 325 or consent of instructor.

FNR 400 Special Problems for Advanced Undergraduates (2-4)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Consent of department head.

FNR 401 Natural Resource Economics (3)

Principles of optimum use of renewable and nonrenewable natural resources, set in a framework of historical resource concerns and real world resource markets. Key resource sectors treated in detail: forestry, fisheries, water resources and natural environments. 2 lectures, 1 laboratory. Prerequisite: ECON 201.

FNR 403 Environmental Impact Analysis (3)

Federal and state environmental impact assessment process. Historical background, legislation and techniques currently in use in the preparation of environmental documents. Selected aspects of environmental law and regulations. Proposal preparation for environmental impact analysis. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: FNR 304 or equivalent, and senior standing.

FNR 404 Environmental Law (3) (Also listed as CRP 404)

Detailed examination of the law governing use and protection of natural resources with focus on the legal institutions entrusted with the public duty of protecting the environment. 3 lectures. Prerequisite: Senior standing, POLS 206, or consent of instructor.

FNR 405 Applied Resource Analysis (4)

Environmental impacts in responses to resource management programs and activities. Preparation, implementation, and

coordination of environmental activities. Criteria for measurements, interpretation, and evaluation. Resource inventories, analysis, synthesis, evaluation, environmental assessment writing and preparation. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: FNR 403 or senior standing.

FNR 406 Natural Resources Administration (2)

Administration of private and public natural resource units, including planning, budgeting, organizing, directing, staffing and controlling units. Key resources administered include forests, water, fish and wildlife, grasslands. 2 lectures. Prerequisite: FNR 302.

FNR 407 Silviculture and Vegetation Management (4)

Interaction of forest and chaparral plant communities; influence of external factors upon wildlands, particularly those suited to forestry practices; growth and development of individual plants; cultural practices and tolerance of forest and chaparral plant communities. Impacts of intermediate and harvest treatments. Miscellaneous course fee required—see *Class Schedule*. Overnight and/or weekend field trips required. 3 lectures, 1 laboratory. Prerequisite: FNR 208, FNR 314.

FNR 408 Water Resource Law and Policy (3) (Also listed as CRP 408)

Detailed examination of the various legal systems of water use, regulation and management in California and the United States. Discussion on the key concepts and principles of state, federal and interstate water quantity and quality control; focusing on issues and problems, why conflicts occur and how solutions evolve. 3 lectures. Prerequisite: FNR 302 or instructor approval, senior standing.

FNR 409 Coastal Resource Management (3)

Natural resource identification and management techniques in coastal environments (land and water), including overview and integration of physical, biological and man-made systems (including regulating) as they influence resource management decisions. 2 seminars, 1 laboratory. Field trips with lab are mandatory. Prerequisite: FNR 304 or one course in biological or physical sciences.

FNR 410 Resource Recreation Management (4)

Practices of management of resource recreation on private and public lands. Consideration of the following management systems: biophysical, user/visitor, facilities, equipment, fiscal, personnel will be made in the provision of resource recreation services. Case studies in mass recreation and wilderness areas will be examined. 3 lectures, 1 laboratory. Some weekend labs necessary. Prerequisite: FNR 112 or consent of instructor.

FNR 415 Forest and Natural Resources Valuation (3)

Wildland, timber, and non-market appraisal, valuation and appraisal techniques. Financial and business aspects of forestry. Economic alternatives in addition to timber production. 2 lectures, 1 laboratory. Prerequisite: FNR 401. FNR 407 recommended.

FNR 417 Resource Recreation Planning (3)

Development and analysis of resource recreation plans. Planning theory, types of plans, scheduling techniques,

projecting supply and demand, application of models, and economic evaluations. Basic recreation planning skills examined. Examples emphasize planning for parks and recreation. 2 lectures, 1 laboratory. Prerequisite: FNR 112 or consent of instructor.

FNR 418 Integrated Forest Resources Management (4)

Methods of organizing forest resources for sustained yield management; regulation of annual cut, and preparation of management plans. Multiple-use resource management will be emphasized. Discussion of Forestry Practices Act. Impact of timber management decisions on wildlife, recreation, range, and watershed resources; importance of human relations, ethics and communication. International aspects of multiple use forest resource management. Miscellaneous course fee required—see *Class Schedule*. Saturday or full-day field trips required. 3 lectures, 1 laboratory. Prerequisite: FNR 314, FNR 407.

FNR 434 Tree Growth and Wood Properties (2)

Physiology of wood formation, effects of hereditary and environmental factors on the structure, properties and uses of wood. Weekend or full-day field trips required. 1 lecture, 1 laboratory. Prerequisite: FNR 332 or consent of instructor.

FNR 438 Wood Energy and Residue Utilization (2)

Present and potential uses, including wood energy, of 1) residue produced by forest and industrial utilization, and 2) biomass plantations. Technologies available for increasing utilization. International and tropical aspects of wood fuel are also considered. Miscellaneous course fee required—see *Class Schedule*. Overnight or full-day field trips required. 1 lecture, 1 laboratory. Prerequisite: FNR 305 or FNR 332 or consent of instructor.

FNR 440 Watershed Management (3)

Concepts of the hydrologic cycle and measurement of its components. Streamflow with emphasis on surface water behavior as affected by land management practices. Saturday field trips required. 2 lectures, 1 laboratory. Prerequisite: FNR 304 and SS 121.

FNR 441 Forest and Range Hydrology (3)

Influence of forest and range vegetation on wildland water resources for optimum production and regulation of water yields. Hydrograph analysis. Techniques for managing wildlands for increases in usable water yields and predicting impacts of land management practices. Analytical evaluation and prediction of watershed disturbances. Overnight field trips required. 2 lectures, 1 laboratory. Prerequisite: FNR 440.

FNR 442 Watershed Protection (2)

Watershed protection and rehabilitation, and water quality aspects of land use. Sampling techniques, cumulative watershed impacts. Development of watershed protection plan. 1 lecture, 1 laboratory. Overnight field trips required. Prerequisite or concurrent enrollment in: FNR 440.

FNR 450 Community Forestry (3)

Development and management of the urban/wildland interface. Socio-economic problems related to forest tree establishment, care, and harvest utilization. International implications also covered. Weekend or full-day field trips

required. 2 seminars, 1 laboratory. Prerequisite: FNR 350 or consent of instructor.

FNR 461, 462 Senior Project (3) (3)

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 180 hours total time.

FNR 463 Undergraduate Seminar (1)

Study and oral presentation of current developments and problems in the subject field. Discussion of recent findings and research and their application. 1 seminar.

FNR 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 lectures. Prerequisite: Consent of instructor.

FNR 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 laboratories. Prerequisite: Consent of instructor.

FNR 500 Individual Study (1–3)

Advanced independent study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Total credit limited to 4 units. Prerequisite: Graduate standing and consent of department head.

FNR 502 Resource Conservation (3)

Conservation, planning and administration for broad treatment of land, water, mineral, forest, range, and wildlife resources. 3 seminars. Prerequisite: Graduate standing and consent of instructor.

FNR 503 Tropical Forest Ecosystem Management (3)

Tropical forest ecosystem classification, function and limitations. Applied tropical forest management systems; tropical problems, management, and political strategies; over-grazing and desertification; overcutting and fuelwood shortages. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

FNR 504 Agroforestry Systems (2)

Principles and practical applications of tree crop systems which are managed to provide fuel, fiber, fodder, and food. Tree crop identification and tree product uses. Plantation design, establishment, and cultural practices. Soil management. Integration of forest, and range management practices and values. Special applications to tropical forest ecosystems. 2 lectures. Prerequisite: Graduate standing or consent of instructor.

FNR 506 World Forestry in Social Context (2)

Problems in design and implementation of technical assistance projects. How social elements impact technical aspects of development programs. Social forestry, community development and extension techniques to coordinate social and technical aspects of development. International

development aspects of social forestry. 2 lectures.
Prerequisite: FNR 504 or consent of instructor.

FNR 521 Natural Resources Management for Educators (3)

Philosophy (theoretical and applied) of natural resource management strategies functioning in today's environment. Ecological principles applicable to specific resource components as they relate to the present perception of today's resource base, use demands and projected utilization. 3 seminars. Prerequisite: Graduate standing.

FNR 570 Selected Topics in Forest Resources (1–3)

Directed group study of selected topics for advanced students. *Class Schedule* will list topic selected. Total credit limited to 9 units. 1–3 seminars. Prerequisite: Graduate standing or consent of instructor.

FNR 571 Selected Topics in Forest Resources Laboratory (1–3)

Directed group laboratory of selected topics for advanced students. *Class Schedule* will list topic selected. Total credit limited to 9 units. 1–3 laboratories. Prerequisite: Graduate standing and consent of instructor.

FNR 581 Graduate Seminar in Forest Resources (3)

Group study of selected developments, trends and problems in the field of forest and natural resources. 3 seminars. Prerequisite: Graduate standing.

FNR 599 Thesis (1–9)

Individual research in forest or natural resources management under the general supervision of faculty, leading to a graduate thesis. Prerequisite: Graduate standing and consent of instructor.

FORL–FOREIGN LANGUAGE

FORL 101, 102, 103 Foreign Language (4) (4) (4)

Organized group instruction arranged for students who wish to acquire basic skill in a foreign language indicated by subtitle. Laboratory drill required. Language taught in its cultural context. To be taken in numerical sequence. 3 lectures, 1 activity.

FORL 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units. Prerequisite: Consent of department head.

FORL 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 lectures. Prerequisite: Consent of instructor.

FR–FRENCH

FR 101, 102, 103 Elementary French (4) (4) (4)

For beginners. Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and basic conversation. Laboratory drill required. Language taught in its cultural context. Credit not available for students who

have completed FR 104. To be taken in numerical sequence. 3 lectures, 1 activity.

FR 104 Intensive Elementary French (12)

Class practice in pronunciation, syntax, reading, writing and conversation including appropriate cultural information. Offered in summer only. Laboratory drill required. 9 lectures, 3 activities.

FR 201, 202 Intermediate French (4) (4)

Review of French grammar and practice in writing and oral expression within a cultural context. 3 lectures, 1 activity. Prerequisite: FR 103 or consent of instructor.

FR 233 Critical Reading in French Literature (4) GEB C.1.

Selected readings in French from major Francophone authors that show the French literary tradition from the Middle Ages to the present in both France and other French-speaking countries. 4 lectures. Prerequisite: FR 202 or equivalent.

FR 301 Advanced French Composition and Grammar (4)

Oral and written development of structural grammar, syntax and complex components of French. Expansion of vocabulary and idiomatic expressions through text study. Translation from English to French and written composition. 4 lectures. Prerequisite: FR 202 or equivalent.

FR 302 Advanced French Conversation and Grammar (4)

Topics focus on culture and selected grammar points. Outlines and/or abstracts constitute written assignments. Individual presentations to elicit spontaneous response. Group presentations to allow cooperative research and preparation. 4 lectures. Prerequisite: FR 202, or consent of instructor.

FR 305 Significant Writers in French (4) GEB C.3.

Critical analysis and oral discussion of poetry, essays, novels, plays. Each course will have a subtitle descriptive of the content. May be repeated to 12 units. 4 lectures. Prerequisite: FR 233 or equivalent.

FR 405 French Literature in English Translation (4) GEB C.3.

Selected works to be read by students in the original or in English translation. Critical analysis, interpretation, and comparison of individual works by outstanding French writers. Lecture in English. *Class Schedule* will list topics selected. Total credit limited to 8 units. 4 lectures. Prerequisite: One literature course or consent of instructor.

FR 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

FRSC–FRUIT SCIENCE

FRSC 123 Beekeeping (3)

Studies and exercises in the handling of European honey bees with special reference to pollination of commercial crops. Honey processing and marketing. Hive inspection and disease detection. 2 lectures, 1 laboratory.

FRSC 131 Pomology (4)

History and outlook for California fruit growing and its relation to world fruit production. General principles of fruit production. Field laboratories in orchard management practices, tree and fruit identification, harvesting, grading and packing. Field trip required. Miscellaneous course fee may be required—see *Class Schedule*. Not open to students with credit in FRSC 230. 3 lectures, 1 laboratory.

FRSC 132 Pomology (4)

Management of tree canopies. Physiological response of trees to pruning and light interception. Strategies to maximize orchard efficiency in pome and stone fruit production. 3 lectures, 1 laboratory. Prerequisite: FRSC 131.

FRSC 133 Pomology (4)

Effects of crop level on fruit species. Management strategies for nuts and small fruits. 3 lectures, 1 laboratory. Prerequisite: FRSC 132.

FRSC 202 Enterprise Project (1–4) (CR/NC)

Beginning field experience in management of orchards and vineyards or honeybees, under faculty supervision. Project participation is subject to approval by the department head and the Cal Poly Foundation. Degree credit limited to 4 units. Credit/No Credit grading only. Prerequisite: CRSC 201, or consent of instructor.

FRSC 230 California Fruit Growing (4)**GEB F.2.**

Interrelationship of climate and cultural techniques on orchard productivity. California's place in the international production-marketing scheme. Field trip required. Miscellaneous course fee may be required—see *Class Schedule*. Not open to students with credit in FRSC 131. 3 lectures, 1 laboratory.

FRSC 231 Viticulture (4)

Understanding of internal and external factors affecting vine productivity. Historical and international perspectives on grape growing. Vineyard production strategies. 3 lectures, 1 laboratory.

FRSC 331 Advanced Viticulture (4)

New research findings related to vine physiology and vineyard productivity. Use of emerging technologies in grape production. 3 lectures, 1 laboratory. Prerequisite: FRSC 231.

FRSC 332 Fruit Plant Propagation (4)

Physiology of fruit crop reproduction. Use of sexual and asexual propagation techniques for fruit crops. Integration of new research into tissue culture, rootstock selection, and commercial fruit and nursery practices. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: FRSC 100-or 200-level course or consent of instructor.

FRSC 342 Citrus and Avocado Fruit Production (4)

World citrus and avocado production and marketing. Grove management techniques. Relationship of environment to species, cultivar, and rootstock selection. Field trip to a major California production area required. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: FRSC 131 or FRSC 230, or consent of instructor.

FRSC 402 Enterprise Project (1–4) (CR/NC)

Advanced experience in production of orchards and vineyards. Development of a plan for field operations, a marketing plan, and a budget. Management decision-making. Project participation is subject to approval by the department head and the Cal Poly Foundation. Degree credit limited to 4 units. Credit/No Credit grading only. Prerequisite: FRSC 202, and consent of instructor.

FRSC 421 Postharvest Technology of Horticultural Crops (4) (Also listed as VGSC 421)

Respiration, respiratory constituents, ripening, and chilling injury; harvesting methods and procedures; current handling and packaging techniques; precooling and refrigeration; modified and controlled atmosphere storage; relative humidity; and transportation of horticultural crops. Field trip to major California production areas required plus local grower visits. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: One production class in either fruits, vegetables or ornamentals, or consent of instructor.

FRSC 422 Tropical Crop, Fruit and Nut Production (4) (Also listed as CRSC 422)

Production, distribution and utilization of major agronomic, vegetable, fruit and nut crops of economic importance in tropical areas. 3 lectures, 1 laboratory. Prerequisite: CRSC, FRSC or VGSC 100/200-level course, or consent of instructor.

FRSC 436 Advanced Production Problems (4)

Production problem analysis. Effects of labor and new technology introductions on existing field practices. 3 lectures, 1 laboratory. Prerequisite: FRSC 421.

FRSC 581 Graduate Seminar in Crop/Fruit Production (3) (also listed as CRSC 581)

Group study of current problems, trends and research results pertaining to production or marketing of field, vegetable or fruit crops. 3 seminars. Prerequisite: Graduate standing.

FSN—FOOD SCIENCE AND NUTRITION**FSN 101 Orientation to Food Science and Nutrition (1) (CR/NC)**

Understanding the depth and breadth of the Food Science and Nutrition Department, the major programs and the university. Emphasis on curriculum and career planning. Food Science and Nutritional Science students are required to complete this course within their first year in the major. Credit/No Credit grading only. 1 lecture.

FSN 121 Fundamentals of Food (4)

Theoretical aspects and practical applications of the principles of food science and food preparation. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CHEM 121.

FSN 170 Introductory Food Science (4)

Principles of basic food science. Chemical, physical, and microbiological properties of foods. Ingredient properties, preservation, and unit processing operations. Overview of the commercial food processing industry at state and national

levels. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory.

FSN 200 Special Problems for Undergraduates (2–3) (CR/NC)

Individual investigation, research studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 3 units per quarter. Credit/No Credit grading only. Prerequisite: Consent of department head.

FSN 201 Enterprise Project (1–4) (CR/NC)

Post-harvest processing of a high quality food product. Project participation is voluntary and subject to approval by the department head and the Cal Poly Foundation. Total degree credit for FSN 201 and FSN 401 combined limited to 12 units. Credit/No Credit grading only. Prerequisite: FSN 170, FSN 209, FSN 211 or FSN 230 and consent of instructor.

FSN 209 Procurement and Use of Muscle Foods (3)

Composition of muscle-based foods in relation to cost, yield, quality, meal preparation and nutritional value. Buying, storing, handling and preservation. Uniform retail and food service identity standards for fresh cuts. Classification and methods of making processed meat products. Credit not allowed for students having completed in FSN 211. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory.

FSN 210 Nutrition (3)

GEB E.2.

Nutrition as it relates to health throughout the life cycle, with emphasis on the young adult. 3 lectures.

FSN 211 Muscle Food Science (3)

Muscle food processing methods and operations. Meat inspection, grading, composition, curing, preservation and related topics. Carcass beef, pork, and lamb will be processed into consumer ready products. Credit not allowed for students having completed FSN 209. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory.

FSN 212 Meat Grading and Evaluation (2)

Factors related to carcass quality and yield. USDA meat grading principles and practices. Judging of carcass and wholesale cuts. Field trip to meat packing plants required. 1 lecture, 1 laboratory. Prerequisite: FSN 211.

FSN 217 Fundamentals of Food Processing Operations (4)

Introduction to the processing aspects of food plant operations. Relationship between unit operations and processes. Calculations dealing with basic fundamentals of food processing operations. 3 lectures, 1 laboratory. Prerequisite: FSN 170, MATH 118, PHYS 104.

FSN 230 Elements of Food Processing (4)

Principles of unit operations in food processing covering canning, freezing, dehydration, fermentation and raw material handling. Food quality and spoilage. Miscellaneous course fee required—see *Class Schedule*. For non-Food Science majors only. 3 lectures, 1 laboratory.

FSN 301 Unit Processing Operations I (4)

Applied food manufacturing and processing technology emphasizing thermal process operations. Major processes

discussed are retort operation, osmotic preservation, extraction and filtration. Product formulation and material balances. Students produce processed foods in a pilot plant. Field trip may be required. 3 lectures, 1 laboratory. Prerequisite: FSN 217.

FSN 302 Unit Processing Operations II (4)

Continuation of FSN 301. Application of various processing operations to different product systems. Water removal in foods (evaporation, vacuum concentration, dehydration), heat removal (refrigeration and freezing), freeze drying and freeze concentration. Small scale food processing and group projects. Field trip may be required. 3 lectures, 1 laboratory. Prerequisite: FSN 301.

FSN 310 Maternal and Child Nutrition (3)

Nutritional requirements from conception to adolescence; role of nutrition in normal development. 3 lectures. Prerequisite: FSN 210, sophomore standing.

FSN 315 Nutrition in Aging (3)

Nutrition as it relates to the middle and later years, with emphasis on the elderly. 3 lectures. Prerequisite: FSN 210, junior standing.

FSN 321 Meal Management (3)

Factors and principles involved in the choice, purchase, and preparation of foods for a meal. Application of management principles in the use of time, energy and money in relation to feeding diverse groups. Planning, preparing, and serving of meals with emphasis on nutritional, aesthetic, and economic aspects of foods. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: FSN 121, FSN 210, or consent of instructor.

FSN 328 Advanced Nutrition I (3)

Metabolism of carbohydrates, fats and proteins as it applies to human nutrition. Evaluation of nutritional status. 3 lectures. Prerequisite: FSN 210, CHEM 328, ZOO 332.

FSN 329 Advanced Nutrition II (3)

Continuation of FSN 328. Biochemical and physiological functions of vitamins and minerals and their interactions with other nutrients. Current topics in nutrition research. 3 lectures. Prerequisite: FSN 328.

FSN 331 Principles of Food Plant Sanitation (3)

Development, organization, management and operation of a food plant sanitation and waste disposal program. Chemistry of detergents, surfactants, and anti-microbial agents. Application of state and federal legal requirements. 3 lectures. Prerequisite: FSN 302; for non-majors FSN 230 and consent of instructor.

FSN 332 Statistical Quality Control (3)

Application of statistical methods in quality control programs and evaluation of operations in food industry. Emphasis on role of SQC in TQM (total quality management). Utilize statistical computer software in SQC processes. Calculator required. 3 lectures. Prerequisite: STAT 211, junior standing or consent of instructor.

FSN 333 Quality Assurance in Food Industries (4)

Chemical, microbiological and physical methods of analyses of foods used in the food plant quality assurance and product

development laboratory. Hazard analysis and critical control point principles for food production. Organization and management of quality control program. Development of food production standards. 3 lectures, 1 laboratory.

Prerequisite: FSN 302, CHEM 326; for non-majors FSN 230 and consent of instructor.

FSN 336 Food Packaging (3)

Packaging materials, packages and packaging methods applicable to a variety of processed and prepared foods. Oral presentation required. Field trip may be required. 3 lectures. Prerequisite: FSN 302; for non-majors FSN 230 and consent of instructor.

FSN 338 Further Processing of Muscle Foods (3)

Science and technology of further meat processing, including curing, sausage manufacturing, intermediate moisture products and restructuring. Raw material selection, product formulation, yield calculations, packaging and use of equipment. Field trip required. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: FSN 209 or FSN 211 and CHEM 326 or consent of instructor.

FSN 339 Cereal Science and Processing (3)

Applied science of cereal-based products, bakery, sheeted, and extruded food products. Principles of cereal chemistry and physical-chemical and functional properties of cereal ingredients. Comparative nutritional evaluation of flours, grains, and finished products. Product development concepts. 3 lectures. Prerequisite: FSN 302; for non-majors FSN 230 and consent of instructor.

FSN 341 Wines and Fermented Foods (3)

Processing, manufacturing and bio-technical applications of fermentation technology for the production of food products. Wine, beer, pickles, olives and other fermented food products important to the post-harvest economy of California. Field trip may be required. 3 lectures. Prerequisite: Junior standing.

FSN 343 Institutional Foodservice I (3)

Principles of equipment selection and floor planning with emphasis on institutional food production and sanitation/safety. 2 lectures, 1 laboratory. Prerequisite: FSN 321 and junior standing.

FSN 344 Institutional Foodservice II (3)

Economic principles and problems involved in planning and preparing food using institutional equipment to meet specific product standards for large groups. 2 lectures, 1 laboratory. Prerequisite: FSN 343.

FSN 400 Special Problems for Advanced Undergraduates (2–4) (CR/NC)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 4 units per quarter. Credit/No Credit grading. Prerequisite: Consent of department head.

FSN 401 Advanced Enterprise Project (1–4) (CR/NC)

Leadership responsibility on enterprise projects. Lead students, under the supervision of instructor, will be accountable for all phases of the project: scheduling times, securing raw product, record keeping, and marketing of the

product. Total degree credit for FSN 201 and FSN 401 combined limited to 12 units. Credit/No Credit grading only. Prerequisite: FSN 201 and junior standing and consent of instructor.

FSN 407 Food Composition Science (4)

Chemical and physical properties of food ingredients. Function and properties of carbohydrates, proteins, fats, pigments and other food ingredients used in the formulation and processing of foods. 3 lectures, 1 laboratory. Prerequisite: FSN 302, CHEM 328, senior standing or consent of instructor.

FSN 409 Sensory Evaluation of Food (4)

Characteristics of food color, consistency, texture and flavor. Sensory difference and consumer acceptance testing methods. Panel training and selection techniques. Problem solving, statistical analysis of data, and management reporting methods. 3 lectures, 1 laboratory. Prerequisite: FSN 302, STAT 211.

FSN 410 Nutritional Aspects of Food Processing (3)

Effects of food manufacturing practices on the nutritional quality of food products. Kinetics of nutrient losses. New developments in research and technology in the field. 3 seminars. Prerequisite: Senior standing, one course in Food Processing, FSN 329, or consent of instructor.

FSN 412 Experimental Nutrition (2)

Nutrient requirements and their evaluation. Quantitative laboratory techniques used in nutrition research. Miscellaneous course fee required—see *Class Schedule*. 2 laboratories. Prerequisite: FSN 329.

FSN 415 Methods of Teaching Nutrition (3)

Selection of valid content and learning activities for a variety of teaching situations and strategies in the classroom, community, or clinic setting. Writing of measurable objectives and the utilization of appropriate motivational and evaluation techniques. Activity designed to prepare students to teach nutrition at all stages of the life cycle. 2 lectures, 1 activity. Prerequisite: FSN 329, EDUC 305, and senior standing.

FSN 416 Community Nutrition (3)

Introduction to federal, state, and local programs. Practice in developing culturally sensitive plans for community assessment, program interventions, and evaluations on behalf of population groups at nutritional risk. 3 lectures. Prerequisite: FSN 415.

FSN 421 Cultural and Aesthetic Aspects of Food (3)

Psychological, sociological, and economic factors that influence the formation of food habits and attitudes. Lab illustrates application of basic principles of food science to food consumption patterns of cultural groups. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: HE 321 or consent of instructor.

FSN 426 Food Systems Management (3)

Principles of successful organization and management with their application to the effective operation of food service. Administrative responsibilities of the food service manager. 3 lectures. Prerequisite: FSN 344, MGT 206, and senior standing.

FSN 429, 430 Diet Therapy I, II (3) (3)

Modification of normal food intake and dietary patterns, with emphasis on dietary adjustments necessitated by certain disease processes and conditions. 2 lectures, 1 laboratory. Prerequisite: FSN 328, FSN 329 and senior standing; 430: FSN 429.

FSN 431 Advanced Muscle Food Science (3)

Physical, chemical and functional properties of muscle foods. Quality assurance and special problems associated with raw materials, processing methods and finished product. 2 lectures, 1 laboratory. Prerequisite: Junior standing, FSN 209 or FSN 211, and CHEM 328 or consent of instructor.

FSN 435 Food Engineering (4)

Principles of material and energy balance as applied to food processing systems. Calculations regarding energy requirements, heat transfer, refrigeration and freezing systems, and pumping heads. 4 lectures. Prerequisite: FSN 302.

FSN 436 Food Laws and Regulations (3)

Federal, state, and local laws and regulations to include case law history affecting the production, processing, packaging, marketing, and distribution of food and food products. 3 lectures. Prerequisite: FSN 302, senior standing.

FSN 437 Advanced Food Processing (4)

Advanced topics in processing operations with emphasis in heat transfer, physical and chemical changes in foods as a function of processing conditions. Oral presentation required. Field trip may be required. 3 lectures, 1 laboratory. Prerequisite: FSN 435.

FSN 440 Internship (1-12)

Career experience with private or public agencies. For Nutritional Science majors only. Total credit limited to 12 units. Maximum of 8 units may be applied toward degree requirements. Prerequisite: FSN 329, FSN 415 (or concurrent) and junior standing and consent of instructor.

FSN 461, 462 Senior Project (3) (3)

Selection and completion of research related to the student's area of interest. Project requires a formal report which must follow departmental guidelines. Minimum of 180 hours required. Prerequisite: ENGL 215 or ENGL 218 and senior standing.

FSN 463 Undergraduate Seminar (2) (CR/NC)

Exploration of students' career opportunities and factors to be considered in career decisions. Recommended enrollment not more than 3 quarters prior to graduation. Credit/No Credit grading only. 2 seminars. Prerequisite: Senior standing.

FSN 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1-3 lectures. Prerequisite: Senior standing.

FSN 471 Selected Advanced Laboratory (1-3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate

students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1-3 laboratories. Prerequisite: Senior standing.

FSN 500 Individual Study (1-6)

Advanced independent study planned and completed under the direction of a member of the department faculty. Total credit limited to 6 units. Prerequisite: Graduate standing, consent of supervising faculty member and graduate adviser.

FSN 501 Lipid Metabolism and Nutrition (3)

Normal and abnormal lipid metabolism in relation to human nutrition at physiological and biochemical levels. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

FSN 581 Graduate Seminar in Food Science and Nutrition (3)

Current findings and research problems in the field and their application to food science and nutrition. *Class Schedule* will list topic selected. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

FSN 599 Thesis (1-6)

Individual research in food science and nutrition under faculty supervision leading to a graduate thesis of suitable quality. Total credit limited to 6 units. Prerequisite: Graduate standing and consent of instructor.

GEOG-GEOGRAPHY**GEOG 150 Human Geography (3)****GEB D.4.a.**

Introduction to the diversity, interrelationships, and spatial features of global cultures. Survey of the field with emphasis on characteristics and/or patterns of population, race, ethnicity, language, religion, government, and economic activity. 3 lectures.

GEOG 215 Human Impact on the Earth (3)

Global assessment of human impact on vegetation, animals, soil, water and atmosphere. Emphasis on problems stemming from the interactions of technology, population growth and natural resources. 3 lectures.

GEOG 250 Physical Geography (3)

Emphasizes the origins of the earth's diverse patterns of climate, landforms, vegetation and soils. Seeks to account for their distribution and interrelationships with human cultures. 3 lectures.

GEOG 305 Political Geography (3)

Spatial influences on man's political behavior. Geopolitics, boundaries, significance of resources on power politics, internal spatial structure of the territorial-state, relationships between territorial-states. 3 lectures. Prerequisite: Junior standing.

GEOG 308 Global Geography (3)**GEB D.4.b.**

Survey of principal elements of global geography; multicultural assessment of interrelationships and/or patterns of human activities and biophysical environments, especially in relation to international linkages and trends. Focus on selected regional examples from the developed and developing worlds. 3 lectures. Prerequisite: Junior standing.

GEOG 310 Urban Geography (3)

Overview of geographic concepts, principles, and generalizations related to urban functions, forms, distribution, and growth. Origin and spread of an urban tradition; cities and their hinterlands; internal structure of cities; neighborhoods and ethnicity in the city. 3 lectures. Prerequisite: Junior standing.

GEOG 315 Geography of Resource Utilization (3)

A multicultural, world view of the interconnections of the following resource systems: food, energy, water and nonfuel minerals. A pervading theme is the sustainability of these systems. 3 lectures. Prerequisite: Junior standing.

GEOG 325 Climate and Humanity (3)

Geographic perspective on the interrelationships between climate and human cultures. Effects of people on climate and the influence of climate and weather upon human activities and behavior. Focus on global human conditions which are responsible for the alteration of climate and in turn are vulnerable to climate change. 3 lectures. Prerequisite: Junior standing or consent of instructor.

GEOG 340 Geography of California (3)

Physical environment of California; ethnic patterns of settlement and landscape alteration; economic development; current problems. 3 lectures. Prerequisite: Junior standing.

GEOG 350 Geography of the United States (3)

The population (including origin, ethnicity, migrations, and distributions), land utilization, and economic development viewed against the background of the physical environment. Topically and regionally organized. Pervading themes include current problems and regional cultural distinctiveness. 3 lectures. Prerequisite: Junior standing.

GEOG 401 Area Geography (3)

Detailed study of a selected world area. Cultural characteristics, land utilization, and economic development viewed against the background of the physical environment. *Class Schedule* will list topic descriptive of the particular world area to be studied. Total credit limited to 12 units. 3 lectures. Prerequisite: Junior standing.

GEOG 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1-3 lectures. Prerequisite: Consent of instructor.

GEOL-GEOLOGY**GEOL 201 Physical Geology (3) GEB B.1.a.**

Processes responsible for the Earth's rocks, structure and surface features. Volcanism, mountain building, plate tectonics, weathering, erosion and deposition by streams, glaciers, wind and waves. 3 lectures.

GEOL 203 Fossils and the History of Life (3) GEB B.1.a.

Fossil record. Mechanisms and patterns of evolution. Adaptation of ancient organisms to their environments. Fossils in the interpretation of Earth history. Important events in the history of life. Historical development of the major groups of invertebrates, vertebrates, and plants. 3 lectures.

GEOL 204 Geologic History of California (3) GEB B.1.a.

Development of California through geologic time. Where and why the rocks appeared. Movement on faults, and mountain building. Geologic processes at work today and yesterday. Relationship of California geology to the rest of the world. 3 lectures. Prerequisite: GEOL 201 recommended.

GEOL 205 Earthquakes and Earth Hazards (3) GEB B.1.a.

Plate tectonics, seismicity and faulting. Quake mechanisms, intensity and magnitude. Measurement and prediction. History. Prevention and planning. Related geological effects. 3 lectures.

GEOL 206 Geologic Excursions (1) (CR/NC) GEB B.1.a.

Field trips to places of geologic interest. *Class Schedule* will indicate destinations. Students must provide their own transportation, food, and camping equipment. May be repeated for a maximum of 3 units provided field trips are taken to different locations. Credit/No Credit grading only. 1 laboratory. Recommended prerequisite or concurrent: GEOL 201 or GEOL 204.

GEOL 207 Geology of the National Parks (3) GEB B.1.a.

Development through time of the rocks, structures, and landforms that are the major scenic elements of our national parks. Emphasis on national parks of the western states. 3 lectures. Prerequisite: GEOL 201 recommended.

GEOL 211 Cities and Geology (3)

Relation of city sites to geology. Planning and geology. Hydrogeology. Foundations of cities. Excavations. Building materials. Urban geological hazards. Case histories and lessons for the future. 3 lectures.

GEOL 241 Physical Geology Laboratory (1) GEB B.1.a.

Properties and identification of minerals and rocks. Topographic maps and landform analysis. Geologic maps and interpretation of rock structure. 1 laboratory. Prerequisite or concurrent: GEOL 201.

GER-GERMAN**GER 101, 102, 103 Elementary German (4) (4) (4)**

For beginners. Class practice in pronunciation, sentence structure, reading, writing and basic conversation using the communicative approach. Laboratory drill required. Language taught in its cultural context. To be taken in numerical sequence. 3 lectures, 1 activity.

GER 201, 202 Intermediate German (4) (4)

Review of German grammar and practice in writing and oral expression within a cultural context. 3 lectures, 1 activity. Prerequisite: GER 103 or consent of instructor.

GER 233 Critical Reading in German Literature (4) GEB C.1.

Selected readings in German from major German-speaking authors that show the German literary tradition from the Middle Ages to the present in Germany and other German-speaking countries. 4 lectures. Prerequisite: GER 202 or equivalent.

GER 301 Advanced German Composition and Grammar (4)

Oral and written development of structural grammar, syntax and complex components of German. Vocabulary expansion and idiomatic construction. Written compositions. Translations to examine linguistic and semantic differences. 4 lectures. Prerequisite: GER 202, or equivalent.

GER 302 Advanced German Conversation and Grammar (4)

Topics focus on culture and selected grammar points. Individual and group presentations and interaction using videos. 4 lectures. Prerequisite: GER 202 or consent of instructor.

GER 305 Significant Writers in German (4) GEB C.3.

Critical analysis and oral discussion of poetry, essays, novels, and plays. *Class Schedule* will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: GER 233 or equivalent.

GER 405 German Literature in English Translation (4) GEB C.3.

Selected works to be read by students in the original or in English translation. Critical analysis, interpretation, and comparison of individual works by outstanding German writers. Lecture in English. *Class Schedule* will list topics selected. Total credit limited to 8 units. 4 lectures. Prerequisite: One literature course or consent of instructor.

GER 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

GRC–GRAPHIC COMMUNICATION**GRC 101 Introduction to Graphic Communication (4)**

Graphic communication history, theory, processes, management and industry segments. Reproduction technology from a systems concept showing fundamental relationships between art and copy preparation and reproduction of print media. 4 lectures.

GRC 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

GRC 204 Introduction to Printing Management (3)

Printing industry structure and business practices. Small business startup. Functional activities of a printing business. Applied organizational and management theory. 3 lectures.

GRC 223 Copy Preparation (3)

Preparation of line and tone copy for the reproduction processes. Designing roughs and visuals and preparation of single- and multi-color mechanicals. Production planning. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory.

GRC 277 Computer Applications in Desktop Publishing (3)**GEB F.1.**

Computer applications, their relationship to print media and publishing. How desktop publishing is influencing and is influenced by society. Use and selection of personal computers, desktop publishing software, and output devices. Terminology, typography, creating, editing, transferring, merging text and graphics. Credit not allowed for GrC majors. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory.

GRC 300 Typography (4)

Typographic principles, practice and layout of high-end electronic display and text composition. Finer points of spacing and type arrangement. Type selection and mark-up. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: GRC 101.

GRC 301 Electronic Publishing Systems (3)

Significance, terminology, and components of electronic publishing systems. Current options for hardware and software used in the graphic communication industry and the advantages and disadvantages of the various options. PostScript and its role in electronic publishing. Evaluating and specifying an electronic publishing system. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: GEB area F.1. requirement and GRC 101.

GRC 302 New Technologies in Graphic Communication (3)

New graphic communication technologies that are impacting the methods and procedures of producing and distributing print media. Application of computers and electronics, laser beams, telecommunication, digital imaging, integrated systems, non-impact printing, and related technologies. Technological transitions and how to manage technological change. Prerequisite: GRC 101 and junior standing.

GRC 307 Color: Theories and Applications (3)

Application of color theories from the sciences and arts to the color producing industries of printing, photography, television, textiles, paints, and plastics. Color technology for communication through images, products, and the environment. 3 lectures. Prerequisite: Junior standing.

GRC 311 Substrates and Ink (3)

Technical aspects of paper, other substrates, and ink used in the printing industry. Manufacture, computerized densitometric and performance testing, and interaction of these materials are examined in relation to particular processes and end use requirements. 2 lectures, 1 laboratory. Prerequisite: GRC 101.

GRC 312 Substrates and Ink: Applications (2)

Technical aspects of paper, other substrates, and ink used in the printing industry. Manufacture, applications, and interaction of these materials are examined in relation to particular processes and end use requirements. Credit not allowed for GRC majors. 2 lectures. Prerequisite: GRC 101.

GRC 322 Advanced Typography (2)

Typographic principles, practice and design of complex text, display and tabular composition for mass print media. Copy

markup and layout procedures for electronic composition, with consideration of printing process requirements. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 1 laboratory. Prerequisite: GRC 300.

GRC 323 Pre-Separated Art for Camera (3)

Manual preparation and separation of line and continuous tone images for multicolor reproduction. Preparation of complex full-color mechanical layouts. Programmable, computer driven cameras, for half-tone and line copy manipulation. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories. Prerequisite: GRC 301.

GRC 324 Binding and Finishing Processes (3)

Imposition techniques, cutting, and folding. Stitch, case and perfect binding techniques and applications. Operational and aesthetic uses of die cutting, scoring, creasing, foil stamping and embossing techniques. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: GRC 101.

GRC 325 Binding and Finishing Processes: Applications (2)

Imposition techniques, cutting, folding, book and publication binding. Stitch, case and adhesive binding techniques and applications. Technology and aesthetic uses of die cutting, scoring, creasing, foil stamping and embossing. Credit not allowed for GRC majors. 2 lectures. Prerequisite: GRC 101.

GRC 326 Printing Equipment Management (3)

Procedures in designing, maintaining and decision making for printing equipment including pneumatics, hydraulics, mechanical and electrical systems. Pollution, safety and training in the graphic communication industry. 2 lectures, 1 laboratory. Prerequisite: GRC 101 and junior standing.

GRC 327 Graphic Arts Photography (4)

Optical and electronic methods of graphic arts photography. Photographic materials and equipment for the graphic arts. Densitometry, light sources, exposure and development control. Line halftone, and color separation theory and practice. Color scanners, color electronic prepress systems and desktop color. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: GRC 301.

GRC 328 Film Assembly and Platemaking (3)

Planning for lithographic plates. Conventional film assembly techniques including the preparation of supports for black and white and flat color stripping using manual methods. Step and repeat techniques. Film contacting and duplicating methods. Manual and computerized techniques for bookwork imposition. Lithographic platemaking theory and practice. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: GRC 301.

GRC 329 Prepress Methods and Procedures (3)

Introduction to graphic arts photography including photographic materials and equipment. Line, halftone and color separation theory and practice. Planning and preparation of film materials for lithographic stripping. Black and white color proofing. Preparation and use of various lithographic plates. Miscellaneous course fee required—see *Class Schedule*. Credit not allowed for GRC majors. 2 lectures, 1 activity. Prerequisite: GRC 101.

GRC 330 Print Reproduction Processes (3)

The functions of press departments in printing segments of commercial, books, advertising, catalogs, newspapers, business forms, magazines, packaging, quick printing. Standard contract language, press checks, quality assurance. Credit not allowed for GRC majors. 2 lectures, 1 activity. Prerequisite: GRC 101.

GRC 331 Color Quality Control (4)

Color sciences and quality control techniques as they relate to the printing and allied industries. Application of color theory to color reproduction, color control, print inspection, process control, and quality measurement. Use of instruments to quantify color properties. 3 lectures, 1 laboratory. Prerequisite: GRC 311.

GRC 333 Printing Plant Layout Analysis (3)

Elements of printing plant site selections, equipment planning, inventory planning, and workflow optimization. Design and layout of printing plants for effective space utilization. Organization of plant services. 2 lectures, 1 activity. Prerequisite: Junior standing, GRC 101 and MATH 117, or MATH 118, or MATH 120.

GRC 335 Line and Halftone Media (4)

Preparation and evaluation of original art copy for commercial use. Laboratory problems in drawing and layout for single and multiple color runs. Various approaches to registration through computer generated images and conversions. Use of color and texture in art copy. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: GRC 301.

GRC 357 Screen Printing Technology (2)

Methods and procedures of screen printing technology; frame, ink, fabric and stencil technology as they relate to printing characteristics. Mechanical art-registration tolerances; commercial production practices; screen printing presses and their applications. Safety and environmental consideration. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 1 laboratory. Prerequisite: GRC 101.

GRC 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

GRC 401 Printing Marketing and Sales (3)

Printing marketing and sales management. Graphic communication market determination, market strategy, and implementation. Strategic sales management, personal selling, forecasting and planning for printed products. 2 lectures, 1 laboratory. Prerequisite: GRC 101.

GRC 403 Printing Estimating (4)

Estimating the cost of various kinds of printed products. Development of budgeted hour costs and production standards. Cost estimating methods for prepress, sheetfed press and finishing operations. Paper estimating for flat sheet and bookwork production. Analysis of material, labor and other cost factors. Overview of computer estimating methods. 3 lectures, 1 laboratory. Prerequisite: GRC 311, GRC 328.

GRC 408 Newspaper and Publications Management (3)

Analysis of newspaper and publications production systems. Organization of the production function. Personnel and industrial problems peculiar to the industry. 3 lectures. Prerequisite: GRC 330 or GRC 416.

GRC 411 Pricing, Costing and Web Estimating (3)

Coordination of customer service, sales and estimating functions to printing industry market trends. Marketing and pricing strategies for printers. Cost estimating for web processes. Evaluating printing company profitability using ratio analysis. Cost-effective techniques for printers including data collection systems and innovative management practices. 3 lectures. Prerequisite: GRC 403 and GRC 416.

GRC 414 Color Image Assembly (2)

Terminology, materials, equipment, facilities and methods used in manual and electronic color image assembly. Registration, masking, color-building, trapping, and screen angling. Film duplicating, contacting, composite film, PostScript output, and color proofing. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 1 laboratory. Prerequisite: GRC 328.

GRC 415 Sheetfed Lithographic Technology (5)

Theory, practice and applications of sheetfed lithographic technology to the printing industry segments of commercial, books, advertising, catalogs, packaging, reprographics. Computerized press controls, scanning densitometers. 4 lectures, 1 laboratory. Prerequisite: GRC 101 and CHEM 122.

GRC 416 Web Printing Technology (5)

Analysis of web press technology for lithography, gravure, flexographic and letterpress printing. Applications for newspapers, packaging, business forms, magazines, books, catalogs and commercial products. Applications of computers to the management and technical function of web technology. 4 lectures, 1 laboratory. Prerequisite: GRC 415.

GRC 417 Advanced Web Printing Technology (2)

Advanced theory and applications of web printing technology to include copy and design reproduction and management decisions as they pertain to the graphic communication field. 2 lectures. Prerequisite: GRC 416.

GRC 421 Printing Production Management (4)

Production planning, scheduling, and control for printed products. Equipment and inventory planning, resource optimization, and the application of quality management principles to the printing industry. 3 lectures, 1 activity. Prerequisite: GRC 101, and MATH 117, MATH 118, or MATH 120.

GRC 422 Printing Supervision and Personnel Issues (4)

Supervising employees and its application to human factors in the graphic communication profession. A total quality management approach is utilized emphasizing policy development, training, safety, motivation, quality specifications, ergonomics, ethical and legal issues in the printing industry. 3 lectures, 1 laboratory. Prerequisite: GRC 101 and senior standing.

GRC 423 Printing Labor Relations (4)

Trends in the graphic arts labor movement. Graphic arts labor unions. Collective bargaining and grievance procedures practiced in the printing industry. Administration of the labor contract by printing plant supervisor. Industry-specific case problems. 3 lectures, 1 activity. Prerequisite: GRC 101.

GRC 429 Computer Imaging (3)

Computer imaging systems in graphic communication. Digital typesetting, CAD systems, integrated pre-press systems, page makeup devices, scanners, monochrome and color terminals, interfacing, and electronic publishing systems. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: GRC 301.

GRC 432 Imaging Systems Management (4)

Management issues associated with the introduction and use of computerized electronic prepress systems. Strategic, technical, marketing, financial, production, operational, and personnel aspects of color prepress work in a capital-intensive environment. 4 lectures. Prerequisite: GRC 101, GRC 327, and GRC 328.

GRC 437 Consumer Packaging (3)

Problem-solving strategies for package printing which integrate concepts from management, design and technology. Package manufacturing, function, quality, visual appeal, and economics are addressed. Consumer packaging industry. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: Junior standing.

GRC 438 Electronic Art Preparation (4)

Preparation and evaluation of current and experimental graphic/typographic images for the major printing processes; pagination and graphic/typographic modification by electronic means. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: GRC 327.

GRC 439 Line and Halftone Media for Books and Publications (4)

Complex and experimental copy electronically generated and art preparation for use in line and halftone reproduction by gravure and offset lithography for book/quality paperback and journal reproduction. Mechanical requirements; production procedures, implemented through computer-controlled production equipment. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: GRC 416, GRC 438.

GRC 440 Advanced Copy Technology for Newspapers and Magazines (4)

Complex copy preparation in line, tone and color for reproduction by offset, gravure, flexography and letterpress (relief) printing. Print production requirements for high-speed computer controlled reproduction presses for magazine and newspaper production. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: GRC 439.

GRC 460 Research Methods in Graphic Communication (1)

Research methods for preparing scholarly and defensible papers and senior projects, and in conducting qualitative and

quantitative evaluations, testing, and research in graphic communication. Methods covered include statistical, historical, descriptive, questionnaires, interviewing, and sampling. 1 lecture. Prerequisite: Senior standing and STAT 211.

GRC 461 Senior Project (3)

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 formal report. Minimum 90 hours total time. Prerequisite: ENGL 215 or ENGL 218, GRC 460, and senior standing.

GRC 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 lectures. Prerequisite: Consent of instructor.

GRC 471 Applied Graphic Communication Management Practices (2)

Management theories and practices in the graphic communication industry. Application of theories and practices to the University Graphic Systems as they apply to commercial printing, publication printing, and newspaper industries. Total credit limited to 6 units. 2 seminars. Prerequisite: Consent of instructor.

GRC 474 Applied Graphic Communication Practices (2) (CR/NC)

Application of theories and practices to the University Graphic Systems as they apply to commercial printing, publication printing, and newspaper industries. Total credit limited to 18 units, with a maximum of 2 units per quarter. Credit/No Credit grading only. 2 activities. Prerequisite: Consent of instructor.

GRC 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

GRC 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

GSB—GRADUATE STUDIES—BUSINESS

GSB 502 Foundations for Quantitative Analysis (4)

Basic quantitative concepts used in the MBA program. Matrices, linear systems of equations, introduction to calculus. Probability, basic statistical concepts and regression. Use of computer software to solve problems. This

course may not be used for credit toward graduation. 4 seminars.

GSB 511 Financial Accounting (4)

Financial accounting model and accounting systems concepts. Principles and concepts used in preparing published financial statements. Interrelationships among those statements. Analysis and interpretation of their content. 4 seminars.

GSB 512 Quantitative Analysis (4)

Introduction to matrices and the concepts of statistical analysis. Probability distributions, point and interval estimation of population means, proportions, and variances. Analysis of variance, regression, correlation, multiple regression, time series, and forecasting. Use of computers to solve problems. 3 seminars, 1 laboratory. Prerequisite: GSB 502 or equivalent.

GSB 513 Organizational Behavior (4)

Examination of major organizational behavior (individual, interpersonal, group, and organizational) concepts, theories and constructs. Presented from an applied perspective with the purpose of increasing one's effectiveness and skill in understanding, analyzing, and managing organizational processes. 4 seminars.

GSB 514 Business, Government and Society (4)

Analysis from social, economic, political, legal and ethical perspectives of the changing domestic and international environment within which the American business enterprise operates. 4 seminars.

GSB 521 Managerial Accounting (4)

Managerial accounting with emphasis on communication and information to assist management in planning and control. Development of an operational understanding of cost systems, budgeting concepts, performance evaluation and other quantitative accounting techniques to assist management in planning and control. Accounting data in computer modeling applications. 3 seminars, 1 activity. Prerequisite: GSB 511.

GSB 522 Management Science (4)

Concepts and techniques of management science. Mathematical programming, decision theory, queuing models, network models, Markov analysis. Game theory. Dynamic programming. Use of computers to solve problems. 3 seminars, 1 laboratory. Prerequisite: GSB 512.

GSB 523 Managerial Economics (4)

Microeconomic analysis and its application to business decisions. Topics include the use of calculus and other quantitative techniques in economic analysis, market structures, pricing strategies, cost analysis and input selection. Examination of the economic impact of various governmental policies on the business firm. 4 seminars. Prerequisite: GSB 512.

GSB 524 Marketing Management (4)

Introduction to marketing management. Concepts and principles necessary to plan, direct and control the product, promotion, distribution and pricing strategies of the firm. 4 seminars.

GSB 531 Managerial Finance (4)

Theories, practices and tools of financial decision making. Topics include financial statement analysis, financial forecasting, valuation, capital budgeting, capital structure, dividends, and an overview of financial markets and institutions. 4 seminars. Prerequisite: GSB 511 and GSB 512.

GSB 532 Information Systems (4)

Overviews of management information systems and decision support systems. Structure of organizational information systems. Process of information systems development. File processing and integrated data base concept. Data communication and on line distributed systems. Management decision making using computer software packages. Report generation using word processing system. Interactive financial planning systems and the decision support systems. 3 seminars, 1 laboratory. Prerequisite: GSB 511.

GSB 533 Aggregate Economics (4)

Theoretical framework and empirical dimensions of the aggregate economic environment in which business enterprise must operate. Understanding of national income accounting, monetary and fiscal policies, inflation, unemployment and balance of payments issues in static and dynamic contexts. Develops an ability to understand macroeconomic events in an evolving and interconnected world economy. 3 seminars, 1 activity. Prerequisite: GSB 523.

GSB 534 Production and Operations Management (4)

Production function and its interaction with other functional areas in an organization. Application of quantitative and statistical methods to planning, control and decision making in operations management. Topics include economics of plant location, logistics, material management, and quality control. 4 seminars. Prerequisite: GSB 522.

GSB 562 Business Strategy and Policy (4)

Integration of total organization imperatives. Case studies and analysis of problems faced by top management. Strategy and policy formulation as affected by environmental factors, competition, technological development, growth objectives and organizational capabilities. Appraisal of total performance and alternative strategies. 4 seminars. Satisfies comprehensive examination requirement. Prerequisite: Must be taken within last 24 units of graduation.

GSB 570 Entrepreneurship and Small Business Management (4)

Exploration in entrepreneurship with emphasis on the formation and management of new business ventures. Analysis of typical operating problems of these firms and application of appropriate techniques for their solution. 4 seminars. Prerequisite: GSB 513.

GSB 571 Organizations and Management (4)

Examination of major theories and conceptual constructs relating to the operating requirements of complex organizations, including manufacturing, service, and nonprofit organizations; historical development of theory and practice; managerial behavior functions and processes. Current issues and actual cases. 4 seminars. Prerequisite: GSB 513.

GSB 572 Seminar in Organization Design (4)

Organization design approaches, configurations, principles, and processes. Diagnosis and redesign of a wide variety of complex organizations in the public, private, and international sectors. Organization design as an organization development technology. 4 seminars. Prerequisite: Second-year standing.

GSB 573 Market Research and Planning (4)

Makes the student a knowledgeable user of marketing research information to develop and implement marketing plans. Emphasis on development of ability for using research information to formulate marketing objectives and strategies and to analyze marketing problems in depth. 4 seminars. Prerequisite: GSB 524.

GSB 574 Seminar in Labor-Management Relations (4)

Exploration of models of labor-management relationships from adversarial to cooperative, in both non-union and union, private and public sectors. Emphasis on labor-management relationships maximizing commitment and performance. Analysis of employee influence. Work organization, reward systems, conflict resolution. 4 seminars. Prerequisite: GSB 513.

GSB 575 Legal Aspects of Business (4)

Managerial approach to important legal issues affecting business and the market system. Focus on those aspects of law which affect managers directly including contracts, products liability and corporations in perspective; principles of partnership authority, liability, and control; managerial duty and liability to the corporation; public control of managerial activity. 4 seminars.

GSB 576 Seminar in Quality and Performance Management (4)

Principles and techniques of quality and performance management as applied to organizations in the private and public sector. Emphasis on competitive implications. Integration of fundamental management techniques, existing improvement efforts, technical tools, and new management technologies focused on continuous organizational improvement. 4 seminars. Prerequisite: GSB 513.

GSB 577 Advanced Quantitative Business Analysis (4)

Case studies using the concepts of GSB 512 Quantitative Business Analysis and GSB 522 Management Science, applied to selected problems in business and industry. These involve concepts of linear programming, quadratic programming, goal programming and advanced forecasting concepts. Solutions of these models obtained using computers. 3 seminars, 1 laboratory. Prerequisite: GSB 522.

GSB 578 Management in an International Environment (4)

Impact of international factors on management. Organizational behavioral strategies in the context of differential economic, technological, political and cultural environments. 4 seminars. Prerequisite: GSB 513.

GSB 579 Manufacturing Strategy (4)

Strategic role of manufacturing in the overall corporate competitive strategy. Matching manufacturing capabilities and marketing needs, capacity planning, matching process technology with product requirements. The experience

curve, vertical integration, managing change, CIM, robotics, and managing international production. 4 seminars. Prerequisite: GSB 534.

GSB 580 Industrial Marketing (4)

Marketing of business goods and services to other businesses, governmental agencies and social institutions by the manufacturer. Market analysis, sales forecasting, product strategy, effective use of sales force and industrial advertising media. 4 seminars. Prerequisite: GSB 524.

GSB 581 Marketing Management Seminar (4)

Practice in the application of analytical tools and techniques to current and potential marketing problems. 4 seminars. Prerequisite: GSB 524.

GSB 582 High-Technology Marketing (4)

Emphasis on marketing of high-technology products, processes, systems and services. Strategic high-tech product planning and high-tech new product development in the context of marketing management. Market forecast for a non-existing new high-tech product. 4 seminars. Prerequisite: GSB 524.

GSB 583 Management of Human Resources (4)

Major functional areas of human resource management, including human resource planning, job analysis, recruitment, selection, performance measurement, employee training and career development, compensation, legal compliance and employee rights. Emphasis on analysis of human resource problems as they arise in real-world settings. 4 seminars. Prerequisite: GSB 513.

GSB 584 Seminar in Financial Policy (4)

Application of financial theory and models to a variety of financial problems. Analysis and formulation of financial plans developed primarily through the use of cases and other real world examples. Working capital management, investment decisions under conditions of risk, and financing and capital structure decisions. 3 seminars, 1 activity. Prerequisite: GSB 531.

GSB 585 Seminar in Investments (4)

Stock, bond and options market. Emphasis on operations of markets, the efficient markets hypothesis and portfolio theory. Setting investment objectives and managing portfolios given efficient capital markets. 4 seminars. Prerequisite: GSB 531.

GSB 586 Financial Institutions and Markets (4)

Structure of money and capital markets and the financial institutions that operate in these markets. Evaluation of contemporary thought on the evolving market and institutional arrangements. Emphasis on the management policies of the institution. 4 seminars. Prerequisite: GSB 531.

GSB 587 International Financial Management (4)

Analysis of the problems facing the financial manager of an international company. Topics include the international monetary system, mechanics of the foreign exchange market, determinants of exchange rates, financing and investment in foreign currencies, trade financing, international capital budgeting, and international working capital management. 4 seminars. Prerequisite: GSB 531.

GSB 588 Cooperative Education Experience (6) (CR/NC)

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A maximum of 8 units can be used toward graduation. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor and adviser.

GSB 589 Accounting Policy (4)

Role of management in establishing and directing accounting policy. Coverage includes the impact of management decisions on external reporting and taxes and the impact of financial reporting requirements on management decisions. 4 seminars. Prerequisite: GSB 521.

GSB 590 Seminar in Sociotechnical Systems (4)

Systems theory. Manager's role and functions in managing technology. Organizations as sociotechnical systems. Sociotechnical system theory. Sociotechnical system analysis and design. Managing sociotechnical systems. Design experiments that foster the innovative process. 4 seminars. Prerequisite: GSB 513.

GSB 591 Industry Analysis (4)

In-depth study of major industry using analytical tools developed in first-year courses. Intensive investigation of the dynamic environment, markets, technology, financial and economic structures, history and other key factors. Further prospects for the industry explored through preparation of a comprehensive forecast. 4 seminars. Prerequisite: Second-year standing.

GSB 592 Cooperative Education Experience (12) (CR/NC)

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. A maximum of 8 units can be used toward graduation. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor and adviser.

GSB 593 Management and Control of Information Systems (4)

Overviews of information technology trends and implications. Information systems (IS) functions and organization. Strategic planning for information systems. Integration of IS plan with corporate strategy. IS administration and control. Management of IS development and computer operations. IS issues in a multinational environment. 3 seminars, 1 laboratory. Prerequisite: GSB 532.

GSB 594 Future of Business (4)

Examination of the techniques and conclusions of representative future studies by research institutions such as the Rand Corporation, Hudson Institute and The Club of Rome. Analysis of the implications of those conclusions for the operations and role of business in society. 4 seminars. Prerequisite: GSB 514.

GSB 595 Organization Development and Change (4)

Planned change within complex organizations. Organization development models and interventions, including action research, team development, intergroup conflict, structural, and comprehensive approaches. Design and use of action programs to improve organizational effectiveness. 4 seminars. Prerequisite: Second-year standing.

GSB 596 Economic Forecasting (4)

Applications to business planning of selected economic forecasting techniques. Classical time series analysis, Box-Jenkins (ARIMA) models, adaptive (Kalman) filtering models, leading indicators and input-output analysis. Use of computers in solving problems. 3 seminars, 1 laboratory. Prerequisite: GSB 533.

GSB 597 Seminar in Selected Economic Problems (4)

Selected problems analyzed at an advanced level in a particular field, such as international trade, public finance, urban, industrial organization or transportation. 4 seminars. Prerequisite: GSB 533.

GSB 598 Graduate Internship in Business (2-8) (CR/NC)

To permit students to correlate experience and academic knowledge. Placement in a supervised work program in a business or public organization. Minimum forty hours of work experience per two units of credit. A maximum of 8 units can be used toward graduation. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor and adviser.

GSB 599 Individual Research (1-4)

Advanced individual research planned and completed under the direction of a member of the school faculty. Designed to meet the needs of qualified students who wish to pursue investigations which they cannot follow effectively in regularly offered elective courses. Prerequisite: Second-year standing.

HD-HUMAN DEVELOPMENT**HD 102 Human Development: Introduction to Issues and Applications (3)**

Introduction to Human Development as a multidisciplinary field and to Psychology and Human Development at Cal Poly. Illustrative applications of research and scholarship relating to individual, family, educational, and social issues. 3 lectures.

HD 103 Pairing and Marriage (3)

Functional approach to contemporary dating and pairing patterns with emphasis on developing communication during the early developmental stages of the paired relationship. 3 lectures.

HD 108 Child, Family, and Community (3)

Introduction to individual development and socialization processes from life span and human ecology perspectives with emphasis on interactions among the child, the family and community. Not open to HD majors. 3 lectures.

HD 109 Parenting (2)

Philosophies and techniques explored out of which an individual can devise an effective parenting style. Basic skills for parent effectiveness. 2 lectures.

HD 128 Program Planning for Infants and Toddlers (3)

Creating an environment to meet the needs of the infant and toddler. Establishing communication in an atmosphere of trust and providing activities which enhance the emerging capabilities of the infant and toddler. 3 activities.

HD 130 Supervised Study of Children (4)

Faculty supervised experience with children ranging in ages from infancy to middle childhood. Participant observation, data collection skills, planning and conducting activities for individuals and groups in educational or childcare facilities. Prerequisite: HD 102, HD 128 or consent of instructor.

HD 200 Special Problems for Undergraduates (1-3)

Supervised investigation, including a written report, of a topic chosen with prior approval of instructor. Total credit limited to 6 units, with a maximum of 3 units per quarter. Prerequisite: Consent of department head.

HD 203 Family Development (3)

Survey of family living at each stage of the life cycle. Emphasis on developmental approach to understanding families, family subsystems, and family developmental tasks, socio-economic and cultural influences, and family differences. 3 lectures.

HD 209 Early Development: Conception through Childhood (5)

Development and behavior of children from conception through age ten. Intellectual, physical, emotional, and social development of the growing child as s/he relates to the environment. 5 lectures. Prerequisite: PSY 201 or PSY 202, HD 102 or consent of instructor.

HD 211 Early Childhood Learning: Applications for the Preoperational Period (5)

Activities, organizational practices, and methods which promote the development of young children during the preoperational period. 5 activities. Prerequisite: HD 102, HD 128, HD 209, PSY 201 or PSY 202 or consent of instructor.

HD 230 Supervised Study of Children: Early Childhood (4)

Teaching experience with children in a preschool laboratory setting. Participant planning, execution and evaluation of age-appropriate activities. Use and assessment of a variety of observation and performance evaluation tools. 4 laboratories. Prerequisite: HD 130, HD 209, HD 211.

HD 306 Adolescence (3)

Analysis of the years from prepubescence to young adulthood. Current research on individual development and behavior including interaction patterns with peers, family, and others. Multidisciplinary perspective on the interaction among physical, affective, cognitive, social and historical aspects of the youth culture. 3 lectures. Prerequisite: HD 209 or consent of instructor.

HD 308 Adulthood (3)

Analysis of the stages of adulthood. Current research on adulthood including interaction patterns with the family, peers, and others, as well as interrelations among physical, cognitive, and social development of the individual. 3 lectures. Prerequisite: HD 306 or consent of instructor.

HD 311 Early Childhood Learning: Applications for the Transitional Period (5)

Activities, organizational practices and methods which promote children's development during the transitional period. 5 activities. Prerequisite: HD 211.

HD 324 Guiding Young Children (3)

Group process and guidance techniques for adults working with young children in family, community, and educational settings. Examination of cases which require the application of theory to practical situations typically encountered by adults working with young children. 3 lectures. Prerequisite: HD 130, HD 209, HD 311.

HD 330 Supervised Internship (4) (CR/NC)

Faculty-supervised internship. Role of professional apprentice is experienced and analyzed by each student. Credit/No Credit grading only. Prerequisite: HD 211, HD 230, PSY 323, PE 280, junior standing and consent of instructor.

HD 400 Special Problems for Advanced Undergraduates (1–3)

Supervised investigation, including a written report, of a topic chosen with prior approval of instructor. Total credit limited to 6 units, with a maximum of 3 units per quarter. Prerequisite: Consent of department head.

HD 401 Perspectives on Childhood Education (3)

Past, present and future perspectives in theory and practice of childhood education. Analysis of current research issues and applications. 3 seminars. Prerequisite: HD 330 or consent of instructor.

HD 404 Administration of Children's Programs (3)

Organization and administration of programs for young children, preschool and child care centers. Staffing, finance, equipment, records, program evaluations, regulations, public policy and community relations. 3 lectures. Prerequisite: HD 330, HD 401.

HD 405 Advanced Administration of Child Development Centers (3)

Problems of organization in site-specific child care programs. Personnel and child care legal issues. Finance and tax concerns. Public policy and current research. 3 seminars. Prerequisite: HD 404.

HD 430 Advanced Internship (6) (CR/NC)

Faculty-supervised preprofessional experience in a career-related setting which complements the HD 330 internship. Such roles as master teacher, caseworker, therapeutic intern, administrative aide or program specialist are experienced and analyzed by each student. Credit/No credit grading only. Prerequisite: HD or Liberal Studies major, HD 330, and consent of instructor.

HD 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Project must be related to human development field. Results of this project must be presented in a formal, written report. Minimum of 120 hours total time. Prerequisite: PSY 329, HD 330 or HD/PSY 453, HD major, completion of Graduation Writing Requirement, and consent of instructor.

HD 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 lectures. Prerequisite: Consent of instructor.

HIST–HISTORY**HIST 101, 102, 103 History of Western Civilization (3) (3) (3)**

Development of western civilization from earliest times to the present. Political, economic, social, intellectual, and religious contributions of the various peoples to contemporary life. 3 lectures.

HIST 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

HIST 201 United States History (3)**GEB D.1.**

Origins and development of the United States from the 15th century to the New Nation. HIST 201 satisfies the general education requirement of HIST 204 for History majors. 3 lectures.

HIST 204 History of American Ideals and Institutions (3)**GEB D.1.**

Comprehensive thematic study of the historical development of industry, corporations, racial relations, foreign policy and political and constitutional issues since the foundation of the Republic. Such an historical analysis will enable students to better understand contemporary America. Not open to students with credit in HIST 201. 3 lectures.

HIST 270 History through Film (3)

Various historical themes examined through the medium of film. Influence and overall relationship of films to the societies that produced them examined. Total credit limited to 6 units. 2 lectures, 1 laboratory.

HIST 300 Research Methods (3)

Introduction to historical methodology. Emphasis will be upon formulating a research topic; choosing appropriate research strategies and methods; and interpreting primary and secondary sources. Project in lieu of final examination. 3 seminars.

HIST 301 Writing and Research Seminar in History (3)

Intensive writing and research to prepare a major historical essay with a strongly argued thesis and extensive historiographical context. Students prepare written and oral commentaries on papers presented in seminar. Completion of extensive paper in lieu of final examination. 3 seminars. Prerequisite: HIST 300, ENGL 114, and ENGL 125 or PHIL 125 or SPC 125.

HIST 302 Historiography (3)

Theory, interpretation and philosophies of history. 3 seminars. Prerequisite: HIST 300, HIST 301 and junior standing.

HIST 305 History of American Agriculture (3)

Agricultural development with emphasis upon economic, political and social implications. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 306 History of American Technology (3)

Development of industrial, transportation, and agricultural technologies in America. Miscellaneous course fee required—see *Class Schedule*. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 307 History of Science (3)

Historical impact of science on human and physical environments from ancient to modern times. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 308 American Warfare (3)

Inception, induction and impact of American warfare from 1775 to the present within the context of changing ideas and major political, social and economic developments. 3 lectures. Prerequisite: Junior standing.

HIST 311 Early Britain (3)

History of the British Isles from the reconstruction of Celtic history to the end of the Medieval epoch. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 312 Early Modern Britain (3)

History of the British Isles from the end of the Medieval epoch to the era of the American revolution—from Richard III to George III. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 313 Modern Britain: Industry, Empire and War (3)

History of the British Isles from the loss of the American colonies through the era of the World Wars and the dissolution of the British Empire. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 314 The Middle East (3)

Islamic civilization, the Ottoman Empire, origins of Pan-Islamism, Arab, Turkish, Iranian nationalism, impact of World Wars I and II, and the background of contemporary problems. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 315 Modern World History (3) GEB D.2.

Analysis of the interaction of selected traditional and modernizing non-Western cultures with Western industrial imperialism and its attendant forces. Within this context, evaluation of both the nature of industrial imperialism and the way in which it influenced or interfered with the host culture. 3 lectures. Prerequisite: Junior standing.

HIST 325 Comparative History of American Minorities (3)

Analyzes the political, economic and social status of various racial and ethnic groups in the United States, focusing on the history of Asians, African-Americans, Chicanos and Native Americans, emphasizing both the general and particular forces that influenced their experience in America and the varying degrees to which each was able to maintain its cultural identity. Contemporary issues of race, class and gender will be the central thematic focus. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 328 American Indian History (3)

Historical examination of Native American cultures; topics of cultural conflict, changing roles of women, and contributions emphasized. Contemporary race, class and gender issues will be examined. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 329 American Indian Thought (3)

Cultural, spiritual, and intellectual contributions of several Native American societies; the philosophical and religious influences of Indians upon U.S. society; their intellectual and cultural adaptation to White domination. Contemporary issues of race, class, gender and cultural separatism. 3 lectures. Prerequisite: Junior standing.

HIST 331 Afro-American History (3)

Political, cultural and social history of African Americans from the early 17th century to the present. Historical contributions to American cultural and political life. Issues of race, class and gender will be a central focus. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 339 History of Colonial Latin American (3)

Survey of Latin American history in the colonial period from 1492 to the early Nineteenth Century. Special attention to the indigenous cultures, the Iberian civilization, and the evolving relationship between them. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 340 History of Modern Latin America (3)

Social and political history of South America, Mexico, and Cuba during the Nineteenth and Twentieth Centuries. Historical development of economic structure and socio-political and cultural institutions in the region. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 341 History of Modern Central America (3)

Political, social, and economic development of Central American countries in the context of regional history and international politics during the Nineteenth and Twentieth Centuries. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 343 Greece and Rome (3)

Foundations of western civilization; origins and development of the science, technology, philosophy, religion, art, and sociopolitical institutions which produced the modern world; continuity between ancient times and the present. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 346 Medieval Europe (3)

Medieval society from the emergence of feudalism to the beginning of the Renaissance. Triumph of the papacy, development of feudal monarchies and institutions. The Crusades. Recovery of commerce. Rediscovery of Greek thought, and rise of universities. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 347 Renaissance and Reformation (3)

Decline of medieval universalism. Rise of commercial capitalism and dynastic nation-states. Flowering of the Renaissance. Protestant reformation. Economic, political, social, intellectual, and cultural influences. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 348 Religious Wars and Absolutism (3)

Era of the Counter-Reformation and Divine Right absolutism, religious and dynastic wars and their impact on the political, economic, social, religious and cultural fabric of European civilization. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 349 The Age of Revolution and Napoleon (3)

Europe from the death of Louis XIV (1715) to the settlement at Vienna of 1815. International rivalries, continental and global warfare, the philosophy of the Enlightenment. Enlightened Despotism, the French Revolution, and Napoleon. Political, intellectual, economic, and social developments and upheavals during the Eighteenth Century. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 351 Europe in the Age of Reaction and Revolution, 1815-1871 (3)

Reaction to the French Revolution. Industrialization. Liberal socialist and nationalist revolts against the conservative order of 1815. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 352 Europe in the Age of Imperialism and War, 1871-1919 (3)

Maturation of industrialization, socialism and nationalism. Imperialist competition of nation states for world hegemony. Explosion of the First World War. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 353 Europe in the Age of Fascism (3)

Democracy in crisis and the fascist alternatives. Second World War and the recovery of Europe in a bipolar world. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 375 Urban History of America (3)

Growth and development of American cities from the Colonial period through the 1970s. Includes a comparative analysis of American urban areas with city development in Europe, Asia and Africa. Evolution of urban culture, assimilation of European ethnic groups, clash of city and rural values, rise of racial ghettos. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 381 Precolonial African History (3)

Survey of African history from earliest times. Ancient African civilizations, Moslem penetration, the rise of indigenous kingdoms and the continuous impact of trade, including the Atlantic slave trade. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 382 Modern African History (3)

Survey of African in the 19th and 20th centuries including European colonialism, African resistance, the rise of African nationalism and problems since independence. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 383 History of American Thought (3)

Thought and culture in America since the Puritans. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 384 Labor and Work in American History (3)

Labor and work from the colonial period to the present. Analysis of the organization and division of the labor

process, formation of classes, rise of unions and the shift from an industrial to a service and high technology workforce. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 385 Topics in California History (3)

In-depth analysis of selected political, economic, and social issues involved in the development of California from the earliest times to the present. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 386 Frontiers in American History (3)

Development and evolution of the frontier experience in chronological and geographic context. Consideration given to the various political, economic, social, cultural and religious factors which helped to bring about the end of the so-called frontier. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 387 From Colony to Empire: A History of U.S. Foreign Relations (3)

Analysis of the evolution of this culture from an insecure appendage of European colonialism to a global power implementing a foreign policy based on hegemonic assumptions. Analysis of the impact of internal developments on foreign relations. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Miscellaneous course fee may be required—see *Class Schedule*. Prerequisite: Consent of department head.

HIST 401 Colonial America (3)

Age of exploration. European powers in eastern North America. English settlements, development of the English colonies, with emphasis on Virginia and Massachusetts. Proprietary interests, growth of internal control, and colonial conflicts. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 402 American Revolution (3)

Background of the Anglo-American imperial problem. The War for Independence and internal democratic upheaval of the era. Establishment of the new nation, origins of the Constitution, the party system. American foreign policy, the national economy. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 404 The Era of Civil War and Reconstruction (3)

Exploration of the different patterns of life in the United States, in order to comprehend the emergence of sectionalism, the violent struggle of the Civil War, and the readjustments of the Reconstruction years. Emphasis on the experiences of ordinary Americans. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 405 Rise of Industrial America (3)

Interaction between rising industrialism and traditional agrarian democracy. Relationship between the industrial

system and the values of democratic institutions. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 406 Progressive Era (3)

Economic, social, intellectual, and political history, and foreign policy. Progressive response to problems of industrialization, agriculture, and urbanization. Development of the American corporate business system. Era of normalcy and onset of the Depression. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 407 Modern America (3)

Major developments of the mid-Twentieth Century. Change and growth in domestic and foreign policies. The Depression, New Deal, World War II, Cold War. Problems of world leadership and contemporary domestic problems. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 409 Vietnam War at Home and Abroad (3)

Interaction of revolutionary Vietnamese nationalism with U.S. foreign policy. Analysis of the war and its relationship to American society. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 415 East Asian Civilization (3)

Central ideas and institutions which have shaped Chinese, Japanese and Korean civilization since ancient times. Emphasis on cultural themes rather than a political continuum. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 416 Modern Japan (3)

Japan's development as a modern state in the 19th and 20th centuries. Emphasized themes include the conflict of modernity and cultural continuity, the persistence of traditional values and postwar reconstruction of Japanese society. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 417 Modern China (3)

Analysis of Chinese history in the twentieth century, the conflict between modernity and cultural continuity, Chinese Communist Party and People's Republic of China since 1949. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 424 Organizing and Teaching History (3)

Organization, selection, presentation, application, and interpretation of subject matter in history in secondary schools. 3 seminars. Prerequisite: Admission to teacher education program or valid teaching credential.

HIST 426 Imperial Russia (3)

Evolution of Russian autocratic society from the foundation of tsarist absolutism in the Fifteenth Century to 1917. Reaction, reform and revolutionism. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 427 Soviet Russia (3)

Transformation of Russian autocracy from tsarist to Bolshevik under the impact of World War I and the Revolution of 1917. The formative force of Marxism-Leninism, forced collectivization and industrialization, the social engineering of the New Soviet Man. World War II, the Cold War and

peaceful coexistence. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 434 American Women's History to 1870 (3)

Female ideology and experience from the colonial period to the creation of an independent women's movement after the Civil War. Considers how the history of women both reflects and shapes American culture and society. 3 seminars. Prerequisite: Junior standing or consent of instructor.

HIST 435 American Women's History from 1870 (3)

The female past in the more modern period of U.S. history. Considers how transformations in gender roles are reflective of other significant changes in American culture and society. Emphasis on class, race, and ethnic variations in women's experience. 3 seminars. Prerequisite: Junior standing or consent of instructor.

HIST 437 Nazi Germany (3)

Intellectual, social and cultural roots of National Socialist ideology and how they combined under the influence of Adolph Hitler to produce the Nazi Revolution. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 440 Topics and Issues in the History of the United States (3)

Selected topics and issues in United States history. Descriptive subtitles assigned to each course. May be repeated to six units. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 441 Topics and Issues in European History (3)

Selected topics and issues in European history. Descriptive subtitles assigned to each course. May be repeated to six units. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 442 Topics and Issues in Latin American History (3)

Selected topics and issues in Latin American history. Descriptive subtitles will be assigned to each course. May be repeated to six units. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 443 Topics and Issues in Asian History (3)

Selected topics and issues in Asian history. Descriptive subtitles will be assigned to each course. May be repeated to six units. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 444 Topics and Issues in African History (3)

Selected topics and issues in African history. Descriptive subtitles will be assigned to each course. May be repeated to six units. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 445 Topics and Issues in Comparative History (3)

Selected topics and issues in comparative history. Descriptive subtitles will be assigned to each course. May be repeated to six units. 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 460, 461 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Results presented in a formal report. Minimum

of 60 hours time per quarter. Student must enroll in second quarter. Prerequisite: HIST 300, HIST 301, HIST 302.

HIST 463 Undergraduate Seminar (2)

Historical analysis of selected problems and topics for undergraduates. 2 seminars. Prerequisite: HIST 300, HIST 301.

HIST 468 Internship in State and National Park History (3) (3)

Work experience program in interpreting state and national park history. Weekly three-hour seminar and regularly scheduled work experience training at Hearst-San Simeon State Historical Monument. 90 hours of work experience per 3 units of credit. Miscellaneous course fee required—see *Class Schedule*. Recommended preparation: Western Civilization Survey, U.S. and California History, History of Art.

HIST 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Junior standing or consent of instructor.

HIST 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

HIST 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

HIST 590 Seminar in History (3)

Historical analysis of selected problems and topics. *Class Schedule* will list topic selected. Total credit limited to 6 units. 3 seminars. Prerequisite: Graduate standing.

HUM–HUMANITIES

HUM 302 Human Values in Agriculture (3) GEB C.3.

Nature of values at issue in agriculture which impact on the wider community. Technical-factual foundation of needs of agriculture which contribute to value conflicts, discrimination between resolvable and unresolvable conflicts, ethical principles and devices yielding resolutions. Interdisciplinary team taught, with guest lecturers and possible field trips. Literary materials, novels, short stories, and expository history giving dramatic expression to values. 3 seminars. Prerequisite: Junior standing and ENGL 215 or ENGL 218.

HUM 310 Humanities in World Cultures (3) GEB C.3.

An interdisciplinary examination of the humanities in a selected culture. Special focus on the arts, literature, philosophy and foreign language in that culture. *Class Schedule* will list topic selected. Repeatable to 9 units with different course titles. 3 lectures. Prerequisite: Junior standing and ENGL 215 or ENGL 218.

HUM 361 Modernism (4) GEB C.3.

Interdisciplinary survey of the nineteenth and early twentieth-century concepts and cultural movements known as modernism throughout Europe, North America and Latin America. Disciplines include architecture, art, drama, literature, music, philosophy, and photography. 4 lectures. Prerequisite: Junior standing and ENGL 215 or ENGL 218.

HUM 362 Postmodernism (4) GEB C.3.

Development, major characteristics, and social implications of this significant movement within twentieth-century thought. Works studied to be chosen from disciplines including art, architecture, literature, music, literary criticism and philosophy. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

HUM 400 Independent Study Project (1–2)

Independent study project focusing more than one discipline on a problem in the Humanities. May involve travel and/or independent research. Bibliography and study plan submitted in advance. 1–2 activities. Prerequisite: Junior or senior standing and consent of instructor.

HUM 402 Values and Technology (3) GEB C.3.

Humanistic investigation into the theoretical and practical applications of technology with specific reference to the social effects of technological change. For all majors. Nontechnical. 3 lectures. Prerequisite: Junior standing and ENGL 215 or ENGL 218.

HUM 470 Selected Advanced Topics (2–4)

Focused interdisciplinary study of a problem in the Humanities combining the insight and expertise of more than one discipline, such as history, literature, religious studies, philosophy, fine arts and the sciences. *Class Schedule* will list topic selected. 2–4 lectures. Prerequisite: Junior standing and ENGL 215 or ENGL 218.

IME–INDUSTRIAL and MANUFACTURING ENGINEERING

IME 101 Introduction to Industrial and Manufacturing Engineering (1)

Development of the industrial economy and the professions of industrial and manufacturing engineering. Concepts and principles of industrial organization and management. Survey of engineering techniques and areas of application in manufacturing and service systems. Career opportunities review. 1 laboratory.

IME 121 Industrial Systems Analysis (2)

Systems, subsystems, and relationships (interfaces) of industrial systems. Productivity concepts and measurements. Trends in techniques for data gathering, analysis, including

spread sheet analysis, and presentation for management decisions. 1 lecture, 1 laboratory.

IME 122 Manufacturing Survey (1)

Overview of manufacturing processes relating to metals and plastics. Study of materials, including composites. Survey of net shape, materials joining, and material removal processes. Open to all majors. 1 lecture.

IME 141 Manufacturing Processes: Net Shape (1)

Metal casting as a net shape process in manufacturing. Properties of molding materials and methods of casting. Introduction to rapid prototyping. Pattern and casting design principles. Miscellaneous course fee required—see *Class Schedule*. 1 laboratory.

IME 142 Manufacturing Processes: Materials Joining (2)

Theory and application of metal cutting and welding processes. Includes shielded metal arc, flux cored arc, submerged arc, gas metal arc, gas tungsten arc, brazing, resistance, and oxy-acetylene processes. Bonding theory, joint design, codes and testing. Introduction to adhesive bonding. Miscellaneous course fee required—see *Class Schedule*. Open to all majors. 1 lecture, 1 laboratory.

IME 143 Manufacturing Processes: Material Removal (2)

Uses, capabilities, and theoretical and operational characteristics of lathe and milling machine tools, including conventional, automatic and numerical control. Cutting tool characteristics, machining parameters, quality control, and production methods. Design considerations for manufacturing. Introduction to robotics and automation. Miscellaneous course fee required—see *Class Schedule*. Open to all majors. 1 lecture, 1 laboratory.

IME 145 Manufacturing Processes: Machining (1)

Relationship between engineering design and production fabrication. Hole forming by drilling, boring, broaching, punching, piercing and nontraditional methods. Forming and assembly of gauge metal components. Engineering and economic significance of various production techniques. Miscellaneous course fee required—see *Class Schedule*. Open to all majors. 1 laboratory. Prerequisite: IME 143 or consent of instructor.

IME 155 Industrial Welding (1)

Application of various electric welding processes to joining of steel sheet and plate. Includes short circuiting arc, flux cored electrode, gas metal arc, and shielded metal arc processes. Gas welding of steel pipe and hard surfacing. 1 laboratory. Prerequisite: IME 142.

IME 157 Electronic Manufacturing (3)

Design, documentation and fabrication of electronic units with emphasis on CAD/CAM. Prototyping techniques, project planning, and production methods. Student completes working prototype from start to finish in 60 hours of project-oriented laboratory. Miscellaneous course fee required—see *Class Schedule*. Open to all majors. 1 lecture, 2 laboratories.

IME 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a

maximum of 2 units per quarter. Prerequisite: Consent of department chair.

IME 201 Production Costs Estimating (3)

Estimating costs of manufactured products and services based on detailed estimates of labor, materials, overhead and general and administrative expenses. Break even points, price breaks, industrial learning, network cost analysis, multiple regression derived formulas, labor efficiency and cost indices. 3 lectures. Prerequisite: Sophomore standing. Credit not allowed for Industrial Engineering or Manufacturing Engineering majors.

IME 214 Production Control (2)

Coordination of production facilities to meet objectives of customer service, minimum inventory investment, and maximum manufacturing efficiency. Forecasting, statistical determination of order requirements, group technology concepts, input-scheduling and machine loading control techniques. Production systems computer modeling. 2 lectures. Prerequisite: Sophomore standing. Credit not allowed for Industrial Engineering or Manufacturing Engineering majors.

IME 222 Engineering Analysis (3)

Mathematical and statistical methods of evaluating and control of variability of engineering design parameters, predicting deviations from expected averages, grouping data for computations. Computer applications. Quality control concepts and applications. 2 lectures, 1 activity. Prerequisite: MATH 131. Credit not allowed for Industrial Engineering or Manufacturing Engineering majors.

IME 223 Work Design and Measurement (4)

Principles of work simplification and motion analysis. Recording of work flow and methods. Work measurement and standards, time study, synthetic data, predetermined time systems and work sampling. Allowances and performance rating, productivity measures. Work design improvement. Military standards. 3 lectures, 1 laboratory. Prerequisite: MATH 141, IME 141.

IME 233 Computer Aided Manufacturing (2)

Introduction to CAM. Manual and computer part programming. Basic concepts of part design, process planning, manufacturing operations. Tool path definition/verification to production phase. Use of commercially available software. 1 lecture, 1 laboratory. Prerequisite: ETME 142, IME 143, CSC 204 or CSC 251 or equivalent.

IME 234 Robotic Assembly (2)

Product design and planning for robotic assembly. Robot characteristics required for product assembly. Off-line programming environment for robots. Selection of sensors, end-of-arm tooling and control arrangements for robotic assembly. Practical applications using a robot programming language for assembly. 1 lecture, 1 laboratory. Prerequisite: Computer literacy course (F.1.)

IME 239 Industrial Costs and Controls (3)

Estimation of manufacturing costs for production planning, cost analysis, and cost control. Planning, budgeting and control processes. Costs, accounting data and analysis of

variances for managerial control, inventory valuation and decision making. Techniques of forecasting, pricing, cost estimating and cost reduction. 3 lectures. Prerequisite: IME 223.

IME 240 Additional Engineering Laboratory (1–2)

Total credit limited to 4 units, with a maximum of 2 units per quarter. 1 or 2 laboratories.

IME 241 Process Design I (1)

Chip formation, tool geometry, feed and speed rates; producibility, machinability, part and tool materials, cutting fluids, and tool life testing. Finishes and measurement of surface roughness; instrumentation, analysis, and dynamometry; test report writing, documentation, and inspection methods. 1 laboratory. Prerequisite: IME 143, MATH 142.

IME 242 Process Design II (4)

Advanced turning and milling processes; grinding and non-traditional processes. Thread systems and manufacturing; gear manufacturing; tolerancing and fits; project management; manufacturing properties of materials. 2 lectures, 2 laboratories. Prerequisite: IME 241, PHYS 131.

IME 243 Process Design III (4)

Sheet metal fabrication, bend allowance calculations; coating processes, powder-metallurgy and ceramic processes. Deformation processes, sheet metal forming; plastics and composite processes. Finishing processes, fastening and joining by adhesive bonding and welding. 2 lectures, 2 laboratories. Prerequisite: IME 242.

IME 251 Introduction to Manufacturing Engineering Analysis (3)

State of the art electronics manufacturing, processes in manufacturing and assembly. Metrology. Coordinate measuring machines and surface profile analysis. Product design and manufacturability. Value engineering, group technology and parts codification. Analysis of cutting tool forces. 2 lectures, 1 laboratory. Prerequisite: IME 143, MATH 142, CHEM 125.

IME 301 Operations Research I (4)

Introduction to operations research, matrix theory, linear programming formulation and solution. Simplex method, sensitivity analysis, transportation and assignment algorithms. Introduction to linear networks and goal programming. Existing computer programs utilized. 4 lectures. Prerequisite: MATH 242.

IME 303 Project Organization and Management (4)

Design, analysis and implementation of a major industrial/business systems problem. Emphasis on situations requiring resolutions and management decisions by groups representing various elements of an enterprise. Resource leveling and management under constraints. 4 lectures. Prerequisite: Junior standing, IME 239 or equivalent.

IME 304 Operations Research (3)

Introduction to operations research. Matrix theory, linear programming formulations and solution. Simplex method, sensitivity analysis, transportation and assignment algorithms. Introduction to goal programming. Existing computer

programs and algorithms utilized. 3 lectures. Prerequisite: MATH 242.

IME 305 Operations Research II (4)

Queuing models, dynamic programming and inventory models, Markovian processes, simulation modeling, computer programming in solution of problems. 4 lectures. Prerequisite: IME 301 or IME 304, STAT 321.

IME 312 Data Management and System Design (3)

Design and management of industrial data bases and reporting systems. Relationships of financial accounting and production control systems, efficient data entry routines, report formats, data base managers and system benefit cost analysis. 3 lectures. Prerequisite: IME 239, IME 314, CSC 204 or CSC 251.

IME 314 Engineering Economics (3)

Economic analysis of engineering decisions. Determining rates of return on investments. Effects of inflation, depreciation and income taxes. Application of basic principles and tools of analysis using case studies. 3 lectures. Prerequisite: ECON 201 or equivalent, MATH 241.

IME 319 Human Factors Engineering (3) GEB F.2.

Analysis of factors influencing the efficiency of human work. Data on the physical and mental capacities of persons, the physical environment, work organization, and the problem of aging. Human reactions and capabilities related to specific tasks and systems. Design of machines, operations, human computer interface and work environment to match human capacities and limitations, including the handicapped. 3 lectures. Prerequisite: PSY 201 or PSY 202 and junior standing.

IME 334 CAD/CAM (3)

Identification and study of the individual techniques of CAD/CAM as being practiced in modern industry. 2 lectures, 1 laboratory. Prerequisite: IME 233, ETME 143, CSC 251 or a course in a high level computer language.

IME 335 Computer-Aided Manufacturing I (4)

NC and CNC programming; benefits, limitations, and selection of CAD and CAM systems. Graphics-based and conversational language NC. CAD/CAM interface and configuration of software, post-processor generation, curve, surface, and solid model generation. Programmable controllers. 3 lectures, 1 laboratory. Prerequisite: IME 251, CSC 204.

IME 336 Computer-Aided Manufacturing II (4)

Data storage, transfer, distribution, and interchange standards. Interface between CAD/CAM and CIM. Automation strategies. Role of computers in CIM: manufacturing information systems, manufacturing data bases, functions of manufacturing operations, group technology, process planning, and production planning. Flexible Manufacturing Systems. 3 lectures, 1 laboratory. Prerequisite: IME 335.

IME 341 Tool Engineering (4)

Design and engineering of jigs, fixtures, molds, and dies; material selection. Field trips to manufacturing centers. 3

lectures, 1 laboratory. Prerequisite: IME 242, CE 204, MATH 242, PHYS 133, MATE 206.

IME 342 Manufacturing Systems Integration (3)

Survey of facilities layout, human factors, simulation, and production control to provide manufacturing engineering majors with background and aid in selection of technical electives. 3 lectures. Prerequisite: IME 223, IME 239.

IME 356 Manufacturing Automation (4)

Computers in the factory automation environment. Basic control theory including feedback and process synchronization. Programming and use of intelligent controllers, robotic arms, and industrial control systems. Interfacing of electro-mechanical systems; encoders and servo systems; programmable controllers. Computer process control. 3 lectures, 1 laboratory. Prerequisite: IME 233 or IME 335, EE 201, EE 321, ME 211.

IME 357 Advanced Electronic Manufacturing (4)

Electronic manufacturing overview with emphasis on new technologies, planning, producibility, product assurance, packaging and testing. Advanced fabrication techniques and advanced use of electronic CAD/CAM. 2 lectures, 2 laboratories. Prerequisite: IME 157, ENGL 218, EE 321.

IME 361 Advanced Welding Processes (4)

Modern material joining processes, with emphasis on high energy density. Laser beam, electron beam, and plasma arc welding processes. Welding fixtures positioners, and power sources. Welding automation and control. Robotic arc welding. 2 lectures, 2 laboratories. Prerequisite: IME 142, PHYS 133.

IME 362 Welding Quality Control (4)

Weldability of engineering materials. Thermal effects of welding, including residual stresses and distortion. Weld defects, their examination and correction. Mechanical properties and testing of weldments. 2 lectures, 2 laboratories. Prerequisite: IME 361, MATE 206, MATE 241, ME 313.

IME 363 Design for Welding (4)

Welding design, concepts and practices; connection design, and weld sizing. Welding codes and procedure qualification. Cost analysis of welding. 2 lectures, 2 laboratories. Prerequisite: IME 362.

IME 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limit to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

IME 401 Sales Engineering (2)

Concepts and principles of engineering in sales. Role of the professional engineer in the analysis, design, development, production, and final application of a product or system required by the buyer. 2 seminars. Prerequisite: Senior standing in engineering, or consent of instructor.

IME 404 Engineering Economic Decision Management (3)

Quantitative approaches to engineering and management problems. Time value concepts, breakeven and replacement

analysis, optimization techniques for scheduling. Project cost estimation, resource management and risk analysis. Use of computer software packages. For non-majors only. 3 lectures. Prerequisite: Junior standing.

IME 407 Operations Research III (4)

Advanced linear programming as applied to problems in industrial systems. Integer and goal programming. Application of nonlinear, quadratic, dynamic programming concepts. Case studies of current topics in industrial engineering. 4 lectures. Prerequisite: IME 301, IME 305.

IME 408 Systems Engineering (3)

Systems, subsystems, static, dynamic, closed and open systems. Systems design requirements. Performance measures. Process control modeling and analysis, transform methods, linear systems analysis, digital, adaptive and steady state optimal control. Optimal search strategies. Manufacturing, maintenance, replacement and engineering applications. 3 lectures. Prerequisite: IME 305, IME 426, CSC 204 or CSC 251.

IME 409 Economic Decision Systems (3)

Economic evaluation of information for complex decisions. Analysis of risks and uncertainties. Bayes theory and models. Decision theory, sequential decisions, and value of information applied to financial evaluation and control. Major project justification procedures. 3 lectures. Prerequisite: IME 305, IME 314.

IME 410 Inventory Control Systems (4)

Inventory planning and control systems. Implementation of manufacturing resource planning including demand forecasting, production planning, master scheduling, bill-of-material, and inventory master file. Capacity requirements planning and shop floor control. 3 lectures, 1 laboratory. Prerequisite: IME 305, IME 312, or equivalent.

IME 411 Production Systems Analysis (3)

Systems analysis for production control. Design of computer integrated planning and control systems for scheduling manufacturing orders, monitoring operating costs and control system performance evaluation. Development of computer-aided decision making framework. Interactive decision making using simulation modeling. 2 lectures, 1 laboratory. Prerequisite: IME 410, or equivalent.

IME 413 Flexible Manufacturing Systems (3)

Structure of flexible manufacturing systems. Planning and control for FMS. Tool management and operations control. Application of techniques related to production scheduling decisions. Cellular manufacturing and production flow analysis. Case studies of flexible manufacturing systems. Computer applications. 3 lectures. Prerequisite: IME 305.

IME 416 Automation of Industrial Systems (3)

Automation in manufacturing and warehousing. Economic selection of automation systems. Projects in automation. 2 lectures, 1 laboratory. Prerequisite: IME 356, IME 335 or equivalent.

IME 418 Product-Process Design (4)

Unification of product design, process engineering, tool development, and product manufacturing; concurrent

engineering. Study of manufacturability constraints in terms of prototyping, designing, testing, pre-production support, processing, quality, delivery, and customer satisfaction. 3 lectures, 1 laboratory. Prerequisite: IME 314, IME 341, IME 356 or equivalent.

IME 420 Simulation and Expert Systems (4)

Design and analysis of manufacturing and service systems by simulation. Functions of random variables. Random number and function generators, programming, and characteristics of simulation languages. Introduction to rule-based expert systems. 3 lectures, 1 laboratory. Prerequisite: IME 305, IME 312.

IME 421 Manufacturing Organization (3)

Theory and principles of manufacturing organizations. History of industrial organization. Engineering management concepts and practice. Use of case discussion method. Planning and operations in terms of human and other resources and factors within and external to the firm. 3 seminars. Prerequisite: IME 314, PSY 201/PSY 202.

IME 422 Manufacturability Engineering (4)

Manufacturability constraints in terms of issues related to prototyping, designing, testing, preproduction support, processing, quality, delivery, and customer satisfaction. Hands-on projects to discuss the experimental results in dealing with the process of casting, machining, plastic modeling, and electronic board manufacturing. 3 lectures, 1 laboratory. Prerequisite: IME 251, IME 426 or equivalent.

IME 426 Engineering Test Design and Analysis (4)

Data gathering and statistical testing applied to industrial engineering and manufacturing fields. Experimental methods for evaluation and comparisons; interpretation of interference, fatigue, and field data. Engineering experimental design, linear and nonlinear regression, ANOVA, and multifactor ANOVA. Utilization of existing computer software. 4 lectures. Prerequisite: STAT 321.

IME 429 Ergonomics Laboratory (1)

Investigation of various physiological, sensory, and cognitive capabilities and limitations of people in work and living environments through laboratory data collection and statistical analysis. 1 laboratory. Prerequisite: IME 319, IME 426.

IME 430 Quality Engineering (4)

Quality control, reliability, maintainability, and integrated logistic support. Statistical theory of process control and sampling inspection. Risks associated with decisions based on operating characteristics of control charts and sampling plans. Reliability and life testing methods. Economics of statistical QC. 4 lectures. Prerequisite: IME 426 or equivalent.

IME 433 Advanced Work Measurement (3)

Predetermined time systems. Time formulas. Standard data systems. Use of statistical methods. Standard data systems applied to clerical, manufacturing, and micro assembly. Developing and maintaining computerized systems. Course will be administered with project orientation. 2 lectures, 1 laboratory. Prerequisite: IME 223, IME 312, IME 426 or equivalent.

IME 435 Reliability Engineering I (3)

Reliability concepts and mathematical models, mechanical device reliability, electrical device reliability, systems reliability and maintainability, reliability data, assurance program elements. 3 lectures. Prerequisite: IME 305, IME 430.

IME 437 Advanced Human Factors Engineering (3)

Principles, concepts and models used in maximizing human performance capabilities at the workplace. Experimental methods for generating rational data relative to human-machine interface. Data and multi-variate analysis. 2 lectures, 1 laboratory. Prerequisite: IME 319, IME 426.

IME 440 Quality Process Management (3)

Quantitative approaches to engineering and management of quality. Statistical process control, quality assurance concepts. Variability loss and off-line QC. Tolerance design and experimental design. Human factors and managerial dimensions influencing quality. For non-majors only. 3 lectures. Prerequisite: Junior standing.

IME 441, 442 Engineering Supervision I, II (1,1)

Theory and principles of supervision. Application of fundamental concepts and techniques of supervision provided by assignment in engineering laboratories. 1 laboratory each. Prerequisite: IME 141, IME 251, IME 335 (or IME 233), and senior standing. Concurrent enrollment in IME 421 recommended.

IME 443 Facilities Planning and Design (4)

Design concepts and input requirements in planning and design of new or renovation of existing manufacturing systems. Product, process, and flow and activity analysis techniques. Flow lines and buffering techniques. Computer-aided layout design and evaluation. Design of handling systems. Math models of location problems. 3 lectures, 1 laboratory. Prerequisite: IME 251, IME 305, IME 335, or equivalent.

IME 455, 456 Manufacturing Design and Implementation I, II (3) (2)

A mix of industry and in-house structured group projects, using process, tool, computer control, quality knowledge, and societal considerations. Projects will progress through a complete manufacturing cycle from design through implementation. Field trips to manufacturing centers. 455: 3 laboratories, 456: 2 laboratories. Prerequisite: IME 418. Co-requisite: IME 430.

IME 461, 462 Senior Project (2) (3)

Faculty supervised projects typical of problems which graduates encounter in their professions and which involve costs, planning, scheduling and research. Formal written report, suitable for reference library, discussing methods, results and conclusions. Minimum 150 hours total time. Prerequisite: Senior standing (within 3 quarters of graduation), IME 314, IME 443, or IME 418.

IME 463 Undergraduate Seminar (2)

Preparation, oral presentation, and discussion by students of technical papers on recent engineering developments and/or subject matter pertinent to industrial and manufacturing engineering. 2 seminars. Prerequisite: Senior standing (within 3 quarters of graduation).

IME 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 lectures. Prerequisite: Consent of instructor.

IME 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 laboratories. Prerequisite: Consent of instructor.

IME 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and/or other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

IME 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

IME 500 Individual Study (1–3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department chair, graduate adviser and supervising faculty member.

IME 501 Graduate Survey I (3)

Survey of current issues in the design and analysis of the workplace. Methods analysis, work measurement, human factors, automation, cost estimating, and facilities planning issues are covered. Not available for graduate credit in Industrial Engineering. Not for undergraduate students. 3 seminars. Prerequisite: Graduate standing with approval of instructor.

IME 502 Graduate Survey II (3)

Survey of current issues in the mathematical analysis of systems. Industrial statistics, quality control, engineering economy, linear programming, integer programming, inventory theory, Markov processes, queuing theory, and dynamic programming. Not available for graduate credit in Industrial Engineering. Not for undergraduate students. 3 seminars. Prerequisite: Graduate standing or upper division with approval of instructor, MATH 242 or MATH 206, STAT 321.

IME 541 Advanced Operations Research (3)

Models for mathematical programming and operations research. Topics in linear programming, network analysis, and dynamic programming. Operations research models including queuing, inventory, simulation, and Monte Carlo.

Special problems in nonlinear programming and integer programming. 3 seminars. Prerequisite: IME 305, IME 426, or equivalent and graduate standing.

IME 542 Reliability Engineering II (3)

Theory and techniques for determining the reliability of systems and system elements. Influence of failures in series, parallel, and redundant designs. Failure modes and effects. Frequency distributions of failures and failure rates. Methods of estimating, predicting, measuring, and testing for reliability and maintainability. 3 seminars. Prerequisite: IME 430, and graduate standing.

IME 543 Advanced Human Factors (4)

Theory and application of man-machine relations and system design. Concepts of mathematical models, human information input channels, decision making based on capability of human operator. 3 seminars, 1 laboratory. Prerequisite: IME 319 or equivalent, IME 426 or equivalent and graduate standing.

IME 544 Advanced Topics in Engineering Economy (3)

Advanced topics in engineering economy. Replacement analysis, capital budgeting and allocation theory, risk and uncertainty, and benefit-cost analysis. Impacts of governmental and industrial policy. 3 seminars. Prerequisite: IME 314, graduate standing.

IME 545 Advanced Topics in Simulation (3)

Validation of simulation models. Statistical techniques for variance reduction. Experimental design and optimization. Comparison of attributes of simulation language. Review of current manufacturing and service industry applications. 2 seminars, 1 laboratory. Prerequisite: IME 420 and graduate standing.

IME 555 Computer-Integrated Manufacturing (4)

CIM and concurrent engineering concepts. Systems analysis methodologies and functional specifications. Technological and managerial strategies for system integration. Analysis of contemporary CIM frameworks. Information networks and protocols for integrated manufacturing systems. Implementation strategies for CIM and concurrent engineering. 3 seminars, 1 laboratory. Prerequisite: IME 335, IME 411 or equivalent, graduate standing.

IME 556 Technological Project Management (4)

Projects in industrial organizations and enterprises. Emerging technologies and project management. Relationship to strategic plans. Formulating, selecting, structuring, and planning projects. Project organization and control. Overcoming barriers. Role of computers. 4 seminars. Prerequisite: IME 421 or equivalent, graduate standing and experience using computers.

IME 557 Technological Assessment and Planning (4)

Assessing likely future technological environments, speed of industrial change, relationship to business plans of firms. Quality function deployment. Past and present technological evolution. Forecasting quantitative and qualitative approaches. Technological impact assessment and business strategy development. Use of case studies. 4 seminars. Prerequisite: STAT 321, IME 426 or equivalent and graduate standing.

IME 558 Engineering Decision Making (4)

Principles, concepts, models, and case studies of decision making, both quantitative and nonquantitative. Emphasizes commonly used techniques when quantitative models do not exist, do not cover all key factors, or when sufficient data are not available. 3 lectures, 1 laboratory. Prerequisite: IME 301, IME 314, STAT 321 or equivalent and graduate standing.

IME 559 Engineering Research and Development (4)

Principles, approaches and practices for effective engineering innovation, design, research and development (R&D) in business and industry. Relationship of R&D with corporate strategy and technology base. R&D objectives through implementation. Integration of creativity, evaluation, design, and ongoing operations. Case studies. 4 seminars. Prerequisite: IME 314 or equivalent and graduate standing.

IME 560 Quality Engineering II (4)

Integrated total quality system engineering for manufacturing and service firms. Classical and modern quality philosophies and quality assurance and improvement methods. Statistical methods. Designing for quality, continuous quality improvement, and total quality system integration. Case studies. 4 seminars. Prerequisite: IME 421, IME 430, or equivalent.

IME 570 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to graduate students and selected seniors. Topic lists will be provided with class schedule outlines. 1–3 seminars. Prerequisite: Graduate standing and/or consent of instructor.

IME 585 Cooperative Education Experience (6) (CR/NC)

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

IME 595 Cooperative Education Experience (12) (CR/NC)

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

IME 599 Design Project (Thesis) (2) (2) (5)

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis. Prerequisite: Graduate standing and consent of instructor.

IT–INDUSTRIAL TECHNOLOGY**IT 125 Industrial Wood Processes (3) GEB F.2.**

Theory and practice of woodworking processes, materials and equipment used in cabinetmaking and furniture industries. Impact of technology. Cultural and social

implications of technology. Practical applications include the construction of a project. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories.

IT 126 Industrial Materials and Processes (4)

Characteristics, applications and limitations of industrial material systems, including organics, ceramics and metallics. Industrial material processing equipment and processes. 3 lectures, 1 activity. Prerequisite: CHEM 121.

IT 137, 138 Introduction to Industrial Electricity (4) (4)

Theory and application of AC and DC circuits. Theory, principles and industrial usage of generators, transformers, motors, inductive loads, conductors, distribution systems, and power generation. 3 lectures, 1 laboratory. Prerequisite: MATH 120.

IT 141 Plastics Processes and Applications (2) GEB F.2.

Global, cultural and social implications and applications of plastics. Uses, capabilities, and operational characteristics of plastics machinery and processes including recycling. Properties and classes of molds and tools. Injection molding, extrusion, compression molding, rotational molding, foaming, casting, and plastic fabrication. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 1 laboratory.

IT 150 Mechanical/Energy (4)

Introduction to energy sources, energy conversion and power. Fossil, atomic and solar resources. Application of laws of physics and thermodynamics to various mechanical systems. Conversion by current power technology including reactors, internal and external combustion and direct conversion. Power transmission systems and system maintenance including electrical, mechanical, pneumatic, refrigeration, and hydraulic systems. 4 lectures.

IT 200 Special Problems (1–4)

Individual investigations, research, studies or surveys of selected problems. Total credit limited to 8 units with a maximum of 4 units per quarter. Prerequisite: Consent of instructor.

IT 212 Introduction to Industrial and Technical Management (4)

Functions of a technical manager and management styles, relationships and interactions between departments in an industrial organization. Industrial communications and language of technical management. Characteristics, technical management fields, industry and leadership styles. 4 lectures.

IT 232 Introduction to C.A.D. and Other Computer Applications (4)

Drafting methods, geometric constructions, isometric and multiview projection. Introduction to mechanical CAD as well as architectural CAD, as a 3D design and drawing tool used by industrial managers in design, product development, facilities management, industrial communications, and numerical control. Fundamentals of analog and digital computers. Word processing and spreadsheets, number systems, logical and sequential circuits. 2 lectures, 2 laboratories.

IT 301 Current Technological Issues (3) GEB F.2.

Technological issues, benefits and risks of technological decisions. The dynamics of technology and its impact on energy resources, the environment and quality of life. The effects of technological innovation on productivity, travel, communication, leisure and personal expression. Demonstrations of industrial processes will be conducted. 3 seminars. Prerequisite: ENGL/PHIL/SPC 125.

IT 302 Plastics Design (2)

Properties of plastics as a class of materials. Interpretation of plastic design data. Principles underlying the properties of plastics. Design problems. Laboratory applications of plastics processes and their effects on design. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 1 laboratory. Prerequisite: CHEM 121 or consent of instructor.

IT 303 Industrial Quality Control Management (4)

Introduction to quality management principles including TQM, ISO 9000, JIT and Quality Assurance. Statistical process control. The seven basic tools of quality. 4 lectures. Prerequisite: STAT 211.

IT 304 Product Quality Control (3)

Applications at the supervisory level of the overall quality plan for manufacturing. Quality assurance, testing, shop and field inspection techniques, material review, source inspection, vendor surveillance, and quality audit. 3 lectures. Prerequisite: IT 303.

IT 313 Industrial Cost Control (4)

Application of cost estimating techniques on materials and processes and labor analysis in industry. Utilization of techniques and procedures for budgeting, cost reduction and indirect burden calculations. Also covered are: investigate methods of reducing waste and inefficiency in business and industry via time value of money, direct labor and material costing, rate of return, sensitivity analysis and ethical finance and accounting practices. 4 lectures. Prerequisite: IT 212, or consent of instructor.

IT 320 Applied Metal and Ceramics Processes (4)

Application of industrial processes and testing using metals and ceramics. Emphasis on manufacturing methods, equipment use, safety and material standards. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: IT 126, CHEM 121 or consent of instructor.

IT 327 Plastics Technology (4)

Materials, processes and applications of industrial polymers. Basic operations in processing, fabricating and finishing of thermal plastic and thermal setting resins, product and materials testing. Plastics and the environment. Recycling, reuse, source reduction. Hazardous waste. Laws and regulation pertaining to plastics. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CHEM 121.

IT 330 Fundamentals of Packaging (4)

Overview of packaging. Historical development, functions, and materials. Processes and technology employed to protect goods during manufacture, handling, shipment and storage. Container types, package design, development, research and

testing. Economic importance and perspective as an industrial activity. Packaging and the environment, recycling, reuse and source reduction, and laws affecting packaging. 3 lectures, 1 activity. Prerequisite: Consent of instructor.

IT 332 Industrial Electrical and Electronic Systems (4)

Continuation of IT 138. Application of electrical power distribution systems: conductors, circuitry, transformers, motors. Modular approach to the study of electronic control systems. Field trips. 3 lectures, 1 laboratory. Prerequisite: IT 138, MATH 131, PHYS 122.

IT 334 Materials Handling and Packaging (3)

Technical interrelationships between materials handling and packaging. Design, materials, quality control, packaging and product manufacturing. Storage, transportation and marketing. 2 lectures, 1 activity. Prerequisite: IT 330 or consent of instructor.

IT 345 Applied Production Management (4)

Production equipment and systems, tooling, safety, finishes, materials purchasing and acquisition. Production management, problem solving, organization systems and production computer program application. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: IT 126 or consent of instructor.

IT 356 Building Construction (3)

Examination of modern materials and methods of construction as related to residential construction. Team fieldwork on actual construction projects, including decision making and design solutions, job organization, scheduling, bidding procedures and building codes. 1 lecture, 2 laboratories. Prerequisite: IT 125.

IT 400 Special Problems for Advanced Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of instructor.

IT 402 Technical and Management Presentations (4)

Methods, techniques and evaluation of presenting technical and management information to groups. Individual and group presentations using self produced aids including video tape, transparencies, slides, charts, and other media. Media development techniques including technical sketching and video tape editing. 2 lectures, 2 activities. Prerequisite: Junior standing, SPC 201 or SPC 202.

IT 404 Customer Relations (3)

Customer contacts. Personal relationships, ethics, legal relationships. Service contracts, communication channels. 3 lectures. Prerequisite: MKTG 301 or equivalent, or consent of instructor.

IT 405 Industrial Marketing (3)

Investigation of the institutions and channels involved in industrial marketing. Analysis of industrial products, competitors, and consumers. Problems in marketing research, personnel, and management. Individual reports on industrial products, companies or training programs. 3

lectures. Prerequisite: MKTG 301 or equivalent, or consent of instructor.

IT 406 Industrial Management and Supervision (4)

Industrial work forces, resources and industrial management leadership knowledge, skills and methods. Utilization of techniques and procedures such as work simplification, work force profiling, corporate profiling and in-service training. Investigate methods of reducing waste and inefficiency in business and industry considering hiring practices, ethics, interaction analysis, motivation, discipline, labor processes, products, materials and systems. 4 lectures. Prerequisite: IT 212 or consent of instructor.

IT 408 Protective Packaging (3)

Principles of protective packaging development. Packaging of different classes of products. Materials and test methods for cushioning, blocking, barriers, packing. Development of cushion design, problem solving. Analysis of package configurations, closing features, locking devices and labels. Examination of permeability of materials to gases, vapors and liquids, considerations of biological protection of packages and packaging materials. 2 lectures, 1 laboratory. Prerequisite: IT 330, PHYS 121, CHEM 121, or consent of instructor.

IT 409 Machinery For Packaging (3)

Analysis of major types of packaging machinery from a practical, operational and marketing viewpoint. Basic processes utilizing packaging machinery. Specialized operations, contract specifications, selection, operation and maintenance. Required field trips to packaging operations. 2 lectures, 1 laboratory. Prerequisite: IT 330, PHYS 104 or PHYS 121, or consent of instructor.

IT 410 Industrial Planning (4)

Planning systems and technique for new products, process or other industrial situations. Team development, planning computer program application and planning phases. 3 lectures, 1 laboratory. Prerequisite: IT 212, IT 232, or consent of instructor.

IT 411 Industrial Safety and Health Management (4)

Industrial safety and health management: Worker safety and health legislation; worker's compensation, hazardous waste management requirements of industry; employer/employee responsibility and liability as related to the worker's safety and health and the environment. Hazards and their control in industrial facilities: mechanical, electrical, pressure, explosions/explosives, heat/temperature, falls/falling objects/impacts, radiation, vibration/noise, toxic substances, fire/fire suppression. 3 lectures, 1 activity. Prerequisite: ENGL/PHIL/SPC 125 or consent of instructor.

IT 419 Industrial Internship (2-6) (CR/NC)

Part-time industrial experience or early field experience in an approved school, with or without pay. Conducted under company or school personnel supervision, and University faculty supervision. Guided observations related to technical management or education. Report of experiences required at end of quarter. 30 hours work experience per unit of credit. Credit/No Credit grading only. Prerequisite: Consent of instructor.

IT 420 Corporate Training (3)

Developing and managing curriculum for an industrial learning setting. Assessing resources. Developing a philosophy, sequencing objectives, and properly using materials in training, evaluating and reporting effectiveness. Managing people within this process in an industrial setting. 3 lectures. Prerequisite: ENGL/PHIL/SPC 125.

IT 432 Energy Management (4)

Energy sources, traditional and alternate; energy management including energy auditing and conservation methods and systems. Heat loss and gain through building components, comparison of materials and insulation systems. 3 lectures, 1 activity. Prerequisite: IT 150.

IT 435 Packaging Development Management (3)

Managing the development of industrial and consumer goods packaging from concept to marketplace. Interplay of marketing, economic, technical, production and distribution considerations in developing a package. Organizing the package function for best results. Case studies of package/product successes and failures. Class project for analysis and solution. 3 lectures. Prerequisite: IT 330.

IT 451 Industrial Equipment and Systems (4)

Major mechanical equipment and systems making up the utility and production support systems of a modern industrial facility. Field trips to industrial facilities. 3 lectures, 1 activity. Prerequisite: IT 150, IT 432.

IT 452 Industrial Power and Lighting (3)

Major power systems in a modern industrial plant, including electrical distribution systems and industrial and commercial illumination. Planning and budgeting of industrial power and lighting systems. 3 lectures. Prerequisite: IT 332, IT 451.

IT 453 Plant Maintenance Management (4)

Maintenance function. Maintenance repair, and operations of industrial plant facilities including utility and mechanical systems, preventive maintenance, job control systems, CIM, work estimating, budgeting, other essential services. Field trips to industrial facilities. 3 lectures, 1 activity. Prerequisite: IT 451.

IT 454 Plant Facilities Management (3)

Management of the modern industrial facility, including capital and operating budgeting, forecasting, organization. 3 lectures. Prerequisite: IT 452, IT 453, ECON 201.

IT 461 Senior Project (3)

Selection and completion of a project under faculty supervision. Projects are typical of problems graduates must solve in their field of employment. Project results are presented in a formal report and must be completed during one quarter. Minimum 90 hours total time. Prerequisite: Consent of instructor.

IT 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

IT 471 Selected Advanced Activity (1-3)

Directed group study for advanced undergraduate and graduate students. *Class Schedule* will list topic selected. May be required with IT 470. Total credit limited to 6 units. 1 to 3 activities. Prerequisite: Consent of instructor.

IT 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

IT 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

IT 500 Individual Study (1-6)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Maximum of 6 units may be applied to degree requirements. Prerequisite: Consent of department head or graduate adviser and supervising faculty member.

IT 505 Graduate Seminar (3)

Organize, build, and conduct experimental projects using research techniques. Physical problem solving initiated through research by the student. Prerequisite: Graduate standing.

IT 515 Historical and Philosophical Perspective of American Industry (3)

Study of significant historical and philosophical changes in American industry. 3 seminars. Prerequisite: Graduate standing.

IT 520 Organization and Administration of Industrial and Technical Environments (3)

Current industrial management principles, methods and tools in the administration and organization of industrial and technical environments. 3 seminars. Prerequisite: Graduate standing.

IT 521 Training in Industrial and Technical Systems (3)

Basic principles and practices in the preparation of course guides, courses of instruction and related materials for industrial instruction. 3 seminars. Prerequisite: Graduate standing.

IT 522 Facility Planning (3)

Analysis of major factors in planning and designing industrial and educational facilities. 3 seminars. Prerequisite: Graduate standing.

IT 527 Technical Trends and Issues (3)

Advanced study of current trends and issues relative to industrial and technical systems. 3 seminars. Prerequisite: Graduate standing.

IT 580 Graduate Research in Industrial and Technical Systems (3)

Study of basic research methodology relative to industrial and technical systems. Development of a thesis/project proposal. 3 seminars. Prerequisite: Graduate standing.

IT 599 Industrial and Technical Studies Thesis or Project (5)

Completion of a thesis or project involving individual research that is significant to the field of industrial and technical systems. Student must enroll each quarter in which advisement is received or facilities are utilized. Prerequisite: Graduate standing, IT 580 and consent of instructor.

ITAL-ITALIAN**ITAL 101, 102, 103 Elementary Italian (4) (4) (4)**

Italian for beginners. Class practice in pronunciation, sentence structure, reading, writing, and basic conversation. Laboratory drill required. Language taught in its cultural context. To be taken in numerical sequence. 3 lectures, 1 activity.

JOUR-JOURNALISM**JOUR 201 Journalism History (3)**

Survey of historical influences in the development of today's journalism. Contributions of women and minorities to American mass media. 3 lectures.

JOUR 203 News Writing and Reporting (4)

Introduction to the techniques of reporting and writing news for the news media. Intensive laboratory and field practice in gathering and evaluating information. Writing basic news stories under close supervision. 3 lectures, 1 laboratory. Prerequisite: ENGL 114 and typing proficiency.

JOUR 205 Agricultural Communications (3)

Survey of the media of agricultural communication. Newspaper farm pages and sections, general and specialized agricultural magazines. Radio and TV farm broadcasts. Public and private agencies involved in agricultural communication. Role of California minorities in agriculture. 3 lectures.

JOUR 223 Photojournalism (3)

Application of photographic techniques to journalism. Use of lighting, particularly electronic flash. Use of 35mm camera and other cameras in journalism. Application of darkroom techniques suitable for news media deadline requirements. Integration of photographic and writing skills. 2 lectures, 1 laboratory. Prerequisite: JOUR 203.

JOUR 233 Copy Editing (4)

Introduction to the techniques of newspaper and magazine copy desk work. Rewriting, editing, and writing headlines for news and feature copy. Selecting, cropping, and writing cutlines for photographs and line art. Practical laboratory

experience in editing. 3 lectures, 1 laboratory. Prerequisite: JOUR 203 or equivalent.

JOUR 290 Multicultural Journalism (3)

Role of American journalism (both print and broadcast media) in the social, political, and economic integration into American society of racial and ethnic minorities and women. 3 lectures. Prerequisite: ENGL/SPC/PHIL 125.

JOUR 302 Mass Media Law (4)

Legal basis for freedom of expression. Court decisions resolving conflicts between First Amendment and right to fair trial, privacy, reputation. Source confidentiality, freedom of information, contempt, copyright. Federal and state laws and regulations affecting mass media reporters, editors, publishers. 4 lectures. Prerequisite: JOUR 203.

JOUR 304 Reporting Contemporary Issues (4)

Intermediate experience in reporting and writing news and short feature stories for the news media. Intensive field and laboratory experience in interviewing, beat reporting, covering speeches and meetings and using library and other information sources. 3 lectures, 1 laboratory. Prerequisite: JOUR 203 and JOUR 233.

JOUR 312 Introduction to Public Relations (4)

Growth and development of public relations as a practice in business and industry, government, volunteer agencies and other public institutions. Communications and activities utilized to gain public interest and support. 4 lectures. Prerequisite: Sophomore standing.

JOUR 318 Mass Media in Society (4)

Traditional mass media and the emerging technologies, their methods, functions and dysfunctions. Responsibilities of journalists. The current status of ethnic media in the U.S. Importance of media in society. 4 lectures.

JOUR 331 Advertising (3)

Principles of advertising, advertising psychology, salesmanship, copy, layout, and production for print and broadcast media. Function of advertising in a free market society. Social responsibilities of advertising toward gender and ethnic minorities. Advertising in other cultures. 3 lectures.

JOUR 333 Broadcast News (4)

Beginning broadcast news writing, reporting and editing emphasis on radio. Gathering and producing audio and video materials for news and public affairs programming. Newsroom and studio equipment operation and procedures. 3 lectures, 1 laboratory. Prerequisite: JOUR 203 and JOUR 233.

JOUR 342 Public Relations Media and Methods (4)

Application of public relations techniques with emphasis on writing for media and working with media editors. Preparing news releases, newsletters and other communications. Analysis of the use of broadcast media. Utilization of case studies. 4 lectures. Prerequisite: JOUR 203 and JOUR 312 or consent of instructor.

JOUR 346 Broadcast Announcing (3)

Radio and television announcing of news, public affairs, commercials and the dynamics of radio and television

interviewing. 2 lectures, 1 laboratory. Prerequisite: JOUR 333, SPC 201 or SPC 202.

JOUR 351 Advanced Radio Reporting: KCPR (2) (CR/NC)

Broadcast lab for students holding news positions on radio station KCPR, or other similar supervised experience as determined by the department. Total credit limited to 4 units. Credit/No Credit grading only. 1 lecture, 1 laboratory. Prerequisite: JOUR majors—JOUR 304 and JOUR 333. Non-majors—consent of instructor.

JOUR 352 Advanced Newspaper Reporting: *Mustang Daily* (2)

Reporting lab for students holding editorial or photographic positions on *Mustang Daily*. Total credit limited to 4 units. 1 lecture, 1 laboratory. Prerequisite: JOUR 233 and JOUR 304.

JOUR 353 Advanced Television Reporting: CPTV (2)

Television lab for students involved in news and production on Cal Poly's campus station, CPTV. Total credit limited to 4 units. 1 lecture, 1 laboratory. Prerequisite: JOUR 333 or consent of instructor.

JOUR 385 Mass Media Criticism (4) (Also listed as ENGL 385 and SPC 385)

Examines mass media (especially broadcasting) from a rhetorical/critical perspective. Aims to expand students' understanding of media issues, media's role as critic, and the role of criticism. 4 lectures. Prerequisite: SPC 201 or SPC 202.

JOUR 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

JOUR 401 International Communication (4)

Global communications facilities and operations; world transmission of information; survey of world wire services and international print and electronic media. Analysis of press operations under varying government ideologies, including third world countries. 4 seminars. Prerequisite: Junior standing.

JOUR 402 Social Responsibility of Mass Media (4)

Current issues revolving around the social responsibility of the mass media. Role of the public, government, and media in considerations of media accountability. Professional behavior in media organizations. 4 seminars. Prerequisite: Senior standing, JOUR 318.

JOUR 405 Public Affairs Reporting (4)

Advanced experience in specialized public affairs reporting and writing of investigative and interpretative stories for the news media. Frequent field assignments, with focus on municipal, county, state and federal government affairs. 3 lectures, 1 laboratory. Prerequisite: JOUR 304.

JOUR 407 Feature Writing (3)

Practice in researching, interviewing, and data gathering for nonfiction newspaper and magazine articles. Analysis of articles printed in current publications. 3 lectures. Prerequisite: JOUR 203 or consent of instructor.

JOUR 413 Public Relations Campaigns (4)

Methods employed in dissemination of public information by organizations, institutions and governments. Interaction of media and PR practitioners, case histories, formation and measurement of public opinion. Public opinion survey projects. 4 lectures. Prerequisite: JOUR 203, JOUR 342 or consent of instructor.

JOUR 432 Television News and Production (4)

Advanced broadcast news writing, reporting, editing and producing television news and public affairs programming. Electronic news gathering techniques. Television studio and control room equipment and procedures. Discussion and evaluation of electronic news organizations and policies. 3 lectures, 1 laboratory. Prerequisite: JOUR 223 and JOUR 333 or consent of instructor.

JOUR 434 Advanced Editing (4)

Advanced experience in rewriting and editing news and feature stories, designing and laying out pages for the print media. Experience in writing simple editorials and opinion columns. 3 lectures, 1 laboratory. Prerequisite: JOUR 233, JOUR 304.

JOUR 444 Media Internship (3)

Application of techniques on daily basis with media under supervision of department faculty. Prerequisite: Junior standing in Journalism and consent of instructor.

JOUR 460 Senior Project (3)

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 90 hours total time.

JOUR 470 Selected Advanced Topics (2–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 8 units. 2–4 lectures. Prerequisite: Consent of instructor.

JOUR 487 Cooperative Education Experience (6)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total degree credit limited to 3 units. Prerequisite: Junior standing and consent of instructor.

LA–LANDSCAPE ARCHITECTURE**LA 110 Graphic Communication for Landscape Architects (3)**

Communication through descriptive drawing and professional plan graphics, including theories of perspective. 3 laboratories.

LA 111 Three Dimensional Graphics for Landscape Architects (4)

Elements of three dimensional perception/visualization with emphasis on freehand and mechanical perspective drawing methods. Methods will also include presentation and rendering techniques. 4 laboratories. Prerequisite: LA 110 or consent of instructor.

LA 114 Landscape Analysis and Planning (4)

Research and analysis techniques of primary natural components of a landscape. Contour maps, aerial photographs, soil reports, climate and hydrologic studies, vegetation surveys, visual and sensory assessments, program analysis, suitability/sensitivity analyses, and ethics. Mapping, case study reviews, individual and team field studies, research and project analysis and land use planning. Miscellaneous course fee required—see *Class Schedule*. 4 laboratories. Concurrent: SS 121.

LA 150 Graphics Fundamentals (6)

Elements of three dimensional perception/visualization with emphasis on freehand and mechanical perspective drawing methods. Exploration of two and three dimensional graphic techniques including presentation and rendering methods. 6 activities. Prerequisite: Transfer student status or consent of instructor.

LA 151 Design Fundamentals (7)

Exploration of design and planning projects on different scales and in different environmental settings including site, neighborhood, community, city, region. Introduction to principles of environmental design including basic elements and composition. Contextual understanding of landscape architecture and other environmental design disciplines; relationships of natural and cultural elements in the environment and the landscape architect's role in environmental design. Basic principles of design, composition, design process and the creation of spatial settings for human use. 7 activities. Prerequisite: Transfer student status or consent of instructor.

LA 201 Survey of Landscape Architecture (2) GEB F.2.

Survey of the profession of landscape architecture from small space design to regional planning. Relationships between landscape architecture and society and professionals in related fields. 2 lectures.

LA 212 Site Analysis (3)

Introduction to various inventory and analysis methodologies, case study reviews, mapping and overlay techniques, environmental ethics and an overall understanding of the function and structure of the natural landscape. Visual assessment, synthesis techniques and relating mapped analytical data with design program analysis for use in site planning. 2 lectures, 1 laboratory.

LA 213 Site and Terrain Analysis (4)

Introduction to various inventory and analysis methodologies, case study reviews, mapping and overlay techniques, environmental ethics and an overall understanding of the function and structure of the natural landscape. Visual assessment, synthesis techniques and relating mapped analytical data with design program analysis for use in site planning. 2 lectures, 2 laboratories. Enrollment limited to CRP and LA majors.

LA 231 Landscape Architecture Construction (3)

Introduction and application of formulas, principles, and criteria for grading and drainage. Horizontal and vertical road alignment. Cut and fill calculations. Runoff calculations. Miscellaneous course fee required—see *Class Schedule*. 3

laboratories. Concurrent: LA 252. Prerequisite: LA 114, AE 237, MATH 120.

LA 240 Additional Landscape Architecture Laboratory (1–3)

Total credit limited to 6 units, with a maximum of 3 units per quarter. 1–3 laboratories.

LA 251 Fundamentals of Design and Planning in Landscape Architecture (4)

Introduction to the principles of environmental design including basic design elements and composition. Exploration of landscape architectural design and planning projects in various scaled environmental settings including site, neighborhood, urban, regional. Contextual understanding of the relationships of natural and cultural elements in the environment and the landscape architect's role in environmental design. Basic principles of design, composition, design process and the creation of spatial settings for human use. Miscellaneous course fee required—see *Class Schedule*. 4 laboratories. Prerequisite: LA 110, LA 111, LA 114.

LA 252 Fundamentals of Site Planning and Design (4)

Elements of environmental and visual perception including three dimensional site planning and design principles. Spatial design and sequencing of spaces with concern for human behavior and social implications. Behavioral, environmental and natural site factors for program, concept, and design development. Plant characteristics, forms, and ecological conditions as related to landscape architectural design. Miscellaneous course fee required—see *Class Schedule*. 4 laboratories. Prerequisite: LA 251.

LA 253 Applied Design and Planning Fundamentals (5)

Focus on the application of basic design fundamentals to the design of different environments. Included will be development of the skills necessary for solving of grading and drainage problems related to landform manipulation. 5 laboratories. Prerequisite: LA 252.

LA 300 Internship (3) (CR/NC)

Involvement in a work setting related to landscape architecture. Thirty hours work experience per unit of credit. Credit/No Credit grading only. Prerequisite: Third year standing.

LA 310 Introduction to Computing in Landscape Architecture (2)

Introduction to computer software and hardware which is important to landscape architecture. Current issues and applications which can be used in the profession. Laboratory utilizes self-paced learning modules. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 1 laboratory. Prerequisite: GEB F.1. computer literacy elective or consent of instructor.

LA 311 History of Landscape Architecture (3) GEB F.2.

Historical evaluation of man's interaction with outdoor space. Analysis of influences that direct, perpetuate, and form the landscape. 3 lectures.

LA 313 Architectural Design for Landscape Architects (3)

Exposure to architectural design concepts and theories with attention given to historical and contemporary case studies.

Discussions and field trips emphasize architectural implications of materials and methods of construction. 2 seminars, 1 activity. Prerequisite: Third-year standing.

LA 314 Site Planning (3)

Identifies the elements of a site and influences methods and examples of site planning for environmental design projects. Emphasis on interdisciplinary nature of site planning. Regulatory and technical requirements. Creation and evaluation of prototypical site planning projects. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: Upper division standing in ARCH, LA, CRP or related discipline.

LA 318 Applications of GIS in Natural Resources (2) (Also listed as FNR 318)

ARC/INFO Geographic Information System (GIS) computer software to explore relevant environmental issues utilizing natural resources data such as vegetation, soils, habitats, topography and geology. Development of data base, use of software for application to relevant, natural systems. Miscellaneous course fee required—see *Class Schedule*. 2 laboratories. Prerequisite: Junior standing, AG 250 or CSC 110 or consent of instructor.

LA 320 Design Theory for Landscape Architects (3)

Complements the material and knowledge presented in the history of landscape architecture, architecture and art courses. "Design theory" and associated concepts as they are related to landscape architecture. Literature research and analysis of completed design projects. The artists/designers, materials and overall expressions of work are related to the social and economic issues of the time as well as their associations with the other arts and sciences. 3 lectures. Prerequisite: LA 311, LA 323, and permission of the instructor.

LA 321 Concepts in Environmental Decision Making (3)

GEB F.2.

Investigation of theoretical and attitudinal bases of environmentally concerned disciplines. Ecology, perception, behavior and design studies as organizational principles and theories in developing understanding of interface between built and natural environments. 3 lectures.

LA 323 History of Twentieth Century Landscape Architecture (3)

Work, philosophies and design theory of important personalities in the environmental design disciplines of the twentieth century. 3 lectures. Prerequisite: At least one course in either architecture, landscape architecture or planning history.

LA 351, 352 Design for Landscape Architects (5) (5)

Process oriented site design with emphasis on identification of problems and opportunities, creative problem solving, spatial design site analysis, landform, platform, builtform, circulation, detail design and graphic communication. Miscellaneous course fee required—see *Class Schedule*. 5 laboratories. Prerequisite for LA 351: LA 114, LA 253. For LA 352: LA 351.

LA 353 Design for Landscape Architects (6)

Completion of a comprehensive design project with sufficient complexity to encompass many fundamental design and

technical decisions common to landscape architectural design and construction projects. Concept, design development, and working drawings will be prepared as a complete set. An emphasis on planting design, installation and irrigation as related to design and composition. Miscellaneous course fee required—see *Class Schedule*. 6 laboratories. Prerequisite: LA 352.

LA 363 Recreation and Open Space Planning and Design (3)

Planning and design methods for meeting leisure requirements. Issues of recreation and society. Relationship of recreation and open spaces, assessment of needs and supply of resources. 3 lectures. Prerequisite: Must have completed minimum of one 200-level course in planning, design or recreation and third-year standing or consent of instructor.

LA 400 Special Problems for Advanced Undergraduates (1–3)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 3 units per quarter.

LA 410 Information Systems in Landscape Architecture (2)

GIS applications using current software on advanced work stations. Basic GIS concepts including topological data structures, relational database concepts, data input techniques and issues and spatial analysis techniques. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 1 laboratory. Prerequisite: LA 451, LA/FNR 318 or consent of instructor.

LA 411 Regional Landscape History (3)

Developmental history of the landscape in the western region with specific focus on the Basin and Range region and California. One or more field trips required. 3 lectures. Prerequisite: Fourth year standing or consent of instructor.

LA 441 Professional Practice I (2)

Theoretical and practical aspects of professional practice. Addressing professional, human, and business skills. Practice diversity and inter-professional relationships. Professionalism and ethics. Licensure, communication skills, office management and marketing. Construction documentation. 2 lectures. Prerequisite: Fourth year standing, LA 353.

LA 442 Professional Practice II (2)

Practical aspects of professional practice. Addressing methods of contracting professional services. Project management procedures, office practice and conditions. Goal setting, resume and portfolio preparation. Job procurement and licensure requirements. 2 lectures. Prerequisite: Fourth year standing, LA 441.

LA 451 Regional Landscape Assessment (6)

Emphasis on regional landscape assessment and design techniques utilizing geographic information systems (GIS) techniques. Land planning and design issues in regional scale environments. Miscellaneous course fee required—see *Class Schedule*. 6 laboratories. Prerequisite: LA 353 or consent of instructor.

LA 452 Urban Design Collaborative for Landscape Architects (5)

Emphasis in urban and community design issues related to landscape architecture; scales of investigation and application; community involvement techniques. Miscellaneous course fee required—see *Class Schedule*. 5 laboratories. Prerequisite: LA 353.

LA 454, LA 455, LA 456 Design for Landscape Architects (4) (4) (4)

Advanced design studio. Emphasis is on complex design problems and special environmental situations or interdisciplinary work and involvement in current design issues. At least one course in the series must be self-directed. 4 laboratories. Prerequisite: Completion of fourth-year design sequence (LA 451, LA 452, LA 461).

LA 461 Senior Design Project (5)

Student selection and completion of approved design or research project sufficient in scale and complexity to encompass issues common to landscape architecture. Time management, documentation, and communication skills emphasized. Miscellaneous course fee required—see *Class Schedule*. 5 laboratories. Prerequisite: LA 442, LA 451, LA 452.

LA 464 Senior Seminar (1) (CR/NC)

Identification and exploration of problems and opportunities in the environmental design field. Intensive thinking, research and discussion of issues relating to local, regional or global significance. To be taken each quarter during fifth year. Credit/No Credit grading only. 1 seminar. Prerequisite: Fifth-year standing.

LA 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 lectures. Prerequisite: Consent of instructor.

LA 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 laboratories. Prerequisite: Consent of instructor.

LA 481 Visual Resource Management Methods (3)

Investigation and application of the major visual resource management methods relevant to landscape architecture. Theoretical basis for visual resource assessment, the different assessment techniques, and the process of translating assessment results into visual resource management techniques. 2 lectures, 1 laboratory. Prerequisite: Fourth-year or graduate standing.

LA 482 Evaluating Social and Behavioral Factors for Open Space Design (3)

User oriented approach to open space design. Interview and survey techniques, behavioral trace mapping and systematic observation, post occupancy evaluation and similar methods are used to generate user input and feedback in the design process. Understanding the behavioral implications of

designed environments. 2 lectures, 1 laboratory. Prerequisite: Fourth-year or graduate standing or consent of instructor.

LA 483 Special Studies in Landscape Architecture (1–12)

Special issues and problems through research, field trips, seminars and other forms of investigation and involvement. Course requirements are determined prior to each individual project through a contractual agreement between students and department. Departmental Off Campus Study Program guidelines apply. Miscellaneous course fee required—see *Class Schedule*. 1–12 activities. Prerequisite: Fourth or fifth year standing.

LA 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

LA 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

LA 551 Regional Landscape Assessment I (4)

Definition, research and filing of data covering the biological, cultural and physical resources of a specific region. Concepts of regionalism, land planning, reclamation and preservation are integral to the course. Utilization of mainframe and microcomputer facilities and software. 4 laboratories. Prerequisite: LA 410, LA 411, graduate standing or consent of instructor.

LA 552 Regional Landscape Assessment II (4)

Application of data manipulation techniques in order to model both impacts on natural systems and land development potentials. Use of planning strategies to predict outcomes resulting from the land use decision process. Utilization of mainframe and microcomputer facilities and software. 4 laboratories. Prerequisite: LA 551 and graduate standing.

LA 585 Cooperative Education Experience (6) (CR/NC)

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

LA 595 Cooperative Education Experience (12) (CR/NC)

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field.

Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

LIB—LIBRARY

LIB 101 Library Instruction (1)

Instruction and practice in the use of the on-line catalog, reference books, periodical indexes, government documents, and other library materials. Development of student independence and initiative in using the library as a source of information. 1 lecture.

LIB 301 Library Resources in Biology and Agriculture (1)

Sources of information pertaining to biology and agriculture and closely related disciplines. Use of abstracts and indexes for journal articles, reviews, proceedings, dissertations, and government documents. Bibliographic database searching. Search strategy, reference books introduced, bibliographic techniques. 1 lecture. Prerequisite: Junior standing or consent of instructor.

LIB 302 Library Resources and Literature Searches (1)

Sources of information in major subject fields. Reference materials, bibliographic aids, indexing and abstracting tools, periodicals, serials, and other sources. Techniques used in literature searches and preparation of bibliographies. *Class Schedule* will list major subject area covered. Total credit limited to 3 units. 1 lecture. Prerequisite: Junior standing or consent of instructor.

LIB 303 Library Computer Searching (1)

Instruction and practice in use of computerized information retrieval systems including CD-ROM, local and remote on-line catalogs, and vendor services. Emphasis on efficient searching skills utilizing controlled and/or keyword searching, limiters, Boolean logic, and truncation. 1 lecture.

LS—LIBERAL STUDIES

LS 101 Orientation to Liberal Studies (1) (CR/NC)

Exploration of the Liberal Studies Program as preparation for the Multiple Subjects Credential and for alternate career objectives. To be taken during the first quarter in attendance at Cal Poly as a Liberal Studies major. Credit/No Credit grading only. 1 lecture.

LS 461, LS 462 Senior Project (3) (3)

Selection and completion of a project or report under faculty supervision. Topic must be chosen with departmental approval. Results must be presented in a formal, written report. Prerequisite: Senior standing and consent of Liberal Studies Coordinator.

MATE—MATERIALS ENGINEERING

MATE 121 Introduction to Materials Engineering (1)

A lecture series involving materials engineers from industry as well as Cal Poly faculty. 1 lecture.

MATE 122 Introduction to Materials Engineering Analysis (1)

Introduction to materials engineering laboratory practices through demonstrations of laboratory equipment for evaluation of material properties. 1 activity.

MATE 200 Special Problems for Undergraduates (1-4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

MATE 206 Materials Engineering (3)

Structure of matter. Physical and mechanical properties of materials including metals, alloys, ceramics, insulating materials, semiconductors, super semiconductors and polymers. Equilibrium diagrams. Heat treatments, material selection and corrosion phenomena. 3 lectures. Prerequisite: CHEM 121, CHEM 124 or CHEM 127.

MATE 224 Metallography (3)

Interpretation of microstructures in metals and alloys and laboratory methods for revealing and documenting such microstructures. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories. Prerequisite: MATE 206 and MATE 241.

MATE 226 Physical Metallurgy (4)

Physical metallurgy of major ferrous and nonferrous alloy systems. Mineral resources and economics of metal production. Crystal structure and bonding, equilibrium diagrams, phase diagrams, phase transformations, heat treatment. Casting, working and joining of metals. 4 lectures. Prerequisite: MATE 224 or consent of instructor; MATE 246 should be taken concurrently.

MATE 240 Additional Materials Laboratory (1)

Special assignments undertaken by students who need or wish to acquire abilities supplementary to their required course work. Assignments must be of a laboratory nature. Work is done by the student with a minimum of faculty supervision. 1 laboratory. Prerequisite: Consent of department head.

MATE 241 Materials Engineering Laboratory (1)

Laboratory experiments on the heat treatment and resulting properties of steel and aluminum alloys. Effects of cold deformation of metals. Brittle-ductile fracture behavior, equilibrium phase relationships, corrosion. Mechanical behavior of polymers. Construction and behavior of semiconductor devices. 1 laboratory. Prerequisite or concurrent: MATE 206.

MATE 246 Physical Metallurgy Laboratory (2)

Laboratory experiments designed to make the student familiar with the physical metallurgy of major ferrous and nonferrous alloy systems. Melting and casting, cold working and annealing, heat treatment, microstructures, mechanical testing, preparation of engineering reports. Miscellaneous course fee required—see *Class Schedule*. 2 laboratories. Prerequisite: MATE 206 and MATE 241. MATE 226 should be taken concurrently.

MATE 400 Special Problems for Advanced Undergraduates (1-4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 8 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

MATE 401 Electronic Properties of Materials (3)

Basic concepts in electron theory of solids (quantum mechanics, energy band theory, Fermi energy, distribution and density of states), electrical properties and conduction in metals, semiconductors, polymers, ceramics, and superconductors, magnetic phenomena and optical properties in materials with applications in recording media. 3 lectures. Prerequisite: MATE 206, PHYS 133.

MATE 402 Mechanical Behavior of Materials (4)

Uniaxial and complex static stress, stress-strain elastic and plastic relationships. Mechanisms of plastic deformation, dislocation theory, strengthening mechanisms. Brittle, ductile and high temperature fracture. Fatigue, creep, stress-rupture. Strain rate and environmental effects. 4 lectures. Prerequisites: MATE 206, CE 204; MATE 412 should be taken concurrently.

MATE 403 Materials Inspection (3)

Special physical and mechanical techniques for non-destructive and destructive examination of materials, to determine their fitness for service. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories. Prerequisite: MATE 224.

MATE 404 Failure Analysis (3)

Procedures for analyzing failed materials. Actual failure analysis of a failed component by each student. Involves fracture, fatigue, corrosion, overload, using metallography, electron microscopy, energy-dispersive x-ray spectroscopy, chemical analysis and heat treatments. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories. Prerequisite: MATE 226, MATE 402, MATE 403 (MATE 226 may be taken concurrently).

MATE 412 Mechanical Behavior of Materials Laboratory (2)

Tensile, fatigue, creep and impact testing of materials. Miscellaneous course fee required—see *Class Schedule*. 2 laboratories. Prerequisite: MATE 206, CE 204. Concurrent: MATE 402.

MATE 421, 422 Materials Thermodynamics I, II (3) (3)

Physical chemistry of metals. Thermodynamics of liquid and solid metallic systems. Material and energy balances, transport phenomena. Computer applications and simulations of thermodynamic processes. 3 lectures. Prerequisite: MATE 206, CHEM 305. MATE 422: MATE 421.

MATE 424 Ceramic Materials (3)

Development, utilization, and control of properties in ceramic materials (inorganic-nonmetallic solids). Parallel treatment of crystalline insulators, semiconductors, and glasses. Characteristics of ceramic solids (crystals and non-crystals). Thermal, optical, mechanical, magnetic, and electrical properties. Physical chemistry of ceramics. 3 lectures. Prerequisite: MATE 206, CHEM 306.

MATE 425 Corrosion Engineering (4)

Galvanic corrosion, thermodynamics of corrosion, polarization curves, corrosion testing, corrosion control, cathodic protection systems. 3 lectures, 1 laboratory. Prerequisite: CHEM 125 or CHEM 128.

MATE 426 Fracture of Materials (3)

Stress analysis of cracks, energy analysis of fracture process, fracture toughness testing, fail safe design. Use of fracture mechanics in describing fatigue and stress corrosion cracking. 2 lectures, 1 laboratory. Prerequisite: MATE 402, MATE 412, CE 205.

MATE 427 Composites (3)

Molecular structures of composites. Properties, processing techniques and fabrication methods of composites, structure and property relationships. 3 lectures. Prerequisite: MATE 206, CE 204.

MATE 428 Polymers (3)

Molecular structures of polymers and polymer systems. Synthesis, processing techniques, properties and fabrication methods of polymeric materials. 3 lectures. Prerequisite: MATE 206.

MATE 429 Instrumental Analysis (3)

Basic theory and practice of current instrumentation and analytical techniques for the characterization of metallic and non-metallic materials. Laboratory experiments emphasize technique selection methods, specimen preparations for various applications and optimization of experimental parameters for data analysis. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratory. Prerequisite: MATE 206.

MATE 430 Microelectronic Materials Processing (3)

Introductory microelectronics materials processing, including integrated circuit fabrication, assembly and packaging. Crystal growth, epitaxial layer growth, diffusion, ion implantation, oxidation, chemical and plasma assisted etching, photolithography. 3 lectures. Prerequisite: MATE 206.

MATE 434 Welding Engineering I (3)

Principles, primary variables, and metallurgical changes associated with the welding process, concentrating on the heat affected zone. Physics of heat transfer involved in welding and welding processes. Relation between joint design, weld microstructure, and weld properties. Description of weld processes. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories. Prerequisite: MATE 206.

MATE 435 Welding Engineering II (3)

Principles, primary variables, and metallurgical changes associated with the welding process, concentrating on the weld fusion zone. Thermodynamics of welding, solidification kinetics of the weld pool. Heat and mass transfer during solidification. Fusion zone structure and morphology. Hot ductility testing, weldability. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories. Prerequisite: MATE 206.

MATE 436 Welding Engineering III (3)

Current topics in welding. Discussion of areas of intense research. Modeling and simulation of welding and weldments. Welding of Al-Li alloys. Stainless steels for cryogenic applications and substituted stainless steels. Dissimilar metal welds, diffusion and explosive bonding, welding in hostile environments. Robotics, welding

automation. Solder, semiconductor packaging, welding of non-metallic materials. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories. Prerequisite: MATE 206.

MATE 441, 442, 443 Advanced Materials Laboratory I, II, III (1) (1) (1)

Laboratory examination of properties and microstructure—optical and SEM, of superalloys, stainless steels, titanium alloys, dual phase steels, Al-Li alloys and recently developed composite materials. MATE 441: Miscellaneous course fee required—see *Class Schedule*. 1 laboratory. Prerequisite: MATE 226.

MATE 446 Surface Chemistry of Materials (3) (Also listed as CHEM 446)

Surface energy, capillarity, solid and liquid interface. Adsorption, surface areas of solids, contact angles and wetting. Friction, lubrication and adhesion. Relationship of surface to bulk properties of materials. Applications. 3 lectures. Prerequisite: CHEM 306.

MATE 461, 462 Senior Project (1) (4)

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 150 hours total time.

MATE 463 Undergraduate Seminar (1)

Developments, policies, practices and procedures discussed through regular seminar. 1 seminar. Prerequisite: Senior standing.

MATE 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

MATE 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

MATE 500 Individual Study (1–4)

Advanced study planned and completed under the direction of a member of department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Total credit limited to 12 units. Prerequisite: Consent of department head, graduate adviser, or supervising faculty member.

MATE 562 Mechanical Behavior of Materials (4)

Complex stress analysis, dislocation theory, fracture mechanisms, introductory fracture mechanics. Fatigue, creep, brittle-ductile transition, environmental embrittlement.

Special project assignment. 4 seminars. Prerequisite: Graduate standing.

MATE 564 Fracture Mechanics (3)

Stress analysis of cracks, energy analysis of fracture process, fracture toughness testing. Fail safe design. Use of fracture mechanics in describing fatigue and stress corrosion cracking. 2 lectures, 1 laboratory. Prerequisite: Graduate standing.

MATE 599 Design Project (Thesis) (2) (2) (5)

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis. Prerequisite: Graduate standing.

MATH—MATHEMATICS

Satisfactory completion of the Entry Level Mathematics (ELM) requirement is a prerequisite for enrollment in all mathematics courses except MATH 100 and MATH 104.

MATH 100 Beginning Algebra Review (3) (CR/NC)

Review of basic algebra skills at the beginning algebra level intended primarily to prepare students for MATH 104. Course open only to students who have taken the ELM examination and are not qualified for MATH 104. Not for baccalaureate credit. Credit/No Credit grading only. 3 lectures. Prerequisite: Two years of high school algebra.

MATH 104 Intermediate Algebra (3) (CR/NC)

Review of basic algebra skills at the intermediate algebra level intended primarily to prepare students for MATH 116. Not for baccalaureate credit. Credit/No Credit grading only. 3 lectures. Prerequisite: Two years high school algebra and appropriate score on the ELM examination, or credit in MATH 100.

MATH 112 The Nature of Modern Mathematics (3)

GEB B.2.

Contemporary mathematics and the relationship between mathematics and our cultural heritage. Intended to develop an appreciation for the role that mathematics plays in society, both past and present. 3 lectures. Prerequisite: Appropriate score on ELM examination, or an ELM exemption, or credit in MATH 104, and 3 years high school math, including 2 years high school algebra, or equivalent.

¹ MATH 116, 117 Pre-Calculus Algebra I, II (3) (3)

117: GEB B.2.

Pre-calculus college algebra without trigonometry. Topics in algebra and coordinate geometry. Functions and applications, polynomial and rational functions, exponential and logarithmic functions, systems of equations and analytic geometry. Additional topics. MATH 116 and MATH 117 are equivalent to MATH 118. Not open to students with credit in MATH 118 or MATH 120. 3 lectures. Prerequisite for MATH 116: Appropriate score on ELM examination, or an ELM exemption, or credit in MATH 104, and 3 years of high school math including 2 years of high school algebra, or equivalent. Prerequisite for MATH 117: MATH 116.

MATH 118 Pre-Calculus Algebra (4)

GEB B.2.

Pre-calculus college algebra without trigonometry. Special products and factoring, exponents and radicals, partial fractions. Fractional and quadratic equations, determinants, systems of equations. Graphing, inequalities and absolute value, mathematical induction. Binomial theorem, logarithms, complex numbers. MATH 118 is equivalent to MATH 116 and MATH 117. Not open to students with credit in MATH 117 or MATH 120. 4 lectures. Prerequisite: Appropriate score on ELM examination, or an ELM exemption, and 3 years high school math including 2 years high school algebra, or equivalent.

MATH 119 Pre-Calculus Trigonometry (3)

GEB B.2.

Rectangular and polar coordinates. Trigonometric functions, fundamental identities. Inverse trigonometric functions and relations. Complex numbers. Not open to students with credit in MATH 120. 3 lectures. Prerequisite: Appropriate score on ELM examination, or an ELM exemption, and MATH 117 or MATH 118, or equivalent.

MATH 120 Pre-Calculus Algebra and Trigonometry (5)

GEB B.2.

An integrated review course in college algebra and trigonometry covering function concepts and symbols, rectangular coordinates, trigonometric functions, linear and quadratic functions, inequalities, analysis of trigonometric functions, inverse trigonometric functions, exponential and logarithmic functions, systems of equations and complex numbers. MATH 120 is equivalent to MATH 118 and MATH 119. Not open to students with credit in MATH 117, MATH 118, or MATH 119. 5 lectures. Prerequisite: Appropriate score on ELM examination, or an ELM exemption, and 3 years high school math including 2 years high school algebra, and trigonometry, or equivalent.

MATH 124 Finite Mathematics (3)

GEB B.2.

Sets and counting problems. Probability theory including stochastic processes, probability distributions, and Markov Chains. Algebra of vectors and matrices, Gaussian elimination, and the inverse of a square matrix. Applications of matrices. 3 lectures. Prerequisite: ELM requirement, and passing score on Mathematics Placement Examination, or MATH 118, or equivalent.

¹ MATH 131, 132, 133 Technical Calculus (4) (4) (4)

GEB B.2.

Functions, their graphs and limits; techniques and applications of differential and integral calculus; introduction to applied differential equations. Designed principally for technology students and others interested in an applied three-quarter calculus sequence. Not open to students with credit in MATH 142, MATH 143, MATH 318 (respectively) or equivalents. Miscellaneous course fee may be required in sections with a computer component—see *Class Schedule*. 4 lectures. Prerequisite: ELM requirement, and passing score on Mathematics Placement Examination, or MATH 118 and MATH 119, or equivalent.

¹ Each course in a combined listing of sequentially numbered courses is a prerequisite to its successor in the same listing.

**¹ MATH 141, 142, 143 Calculus I, II,
III (4) (4) (4)****GEB B.2.**

Limits, continuity, differentiation, integration. Techniques of integration, applications to physics, transcendental functions. Infinite sequences and series, vector algebra, curves. Miscellaneous course fee may be required in sections with a computer component—see *Class Schedule*. 4 lectures. Prerequisite: ELM requirement, and passing score on Mathematics Placement Examination, or MATH 118 and MATH 119, or equivalent.

**MATH 151, 152, 153 Calculus Laboratories I, II, III (1)
(1) (1) (CR/NC)**

Facilitated study and discussion of the theory, problems, and applications of calculus. Credit/No Credit grading only. 1 laboratory. Prerequisite: Concurrent enrollment in the associated section of MATH 141, MATH 142, or MATH 143.

**MATH 202 Orientation to the Mathematics Major (1)
(CR/NC)**

Career opportunities in the field of mathematics, preparing a field of study, and a survey of departmental facilities and procedures related to research, study and graduation. Credit/No Credit grading only. 1 lecture. Prerequisite: Sophomore standing or consent of instructor.

**MATH 205 Programmable Calculators in Calculus and
Linear Algebra (2)**

Operation of programmable graphing calculators and their application to selected topics in calculus, differential equations and linear algebra. 2 lectures. Prerequisite: MATH 141 or consent of instructor.

MATH 206 Linear Algebra I (4)**GEB B.2.**

Matrices, inverses, linear systems, determinants, eigenvalues, eigenvectors, vector spaces, linear transformations, applications. Miscellaneous course fee may be required in sections with a computer component—see *Class Schedule*. 4 lectures. Prerequisite: MATH 143 or consent of instructor.

**MATH 221 Calculus for Business and
Economics (4)****GEB B.2.**

Polynomial calculus for optimization and marginal analysis. Partial derivatives and elementary integration. Not open to students with credit in MATH 142, MATH 132 or equivalent. 4 lectures. Prerequisite: ELM requirement, and passing score on Mathematics Placement Examination, or MATH 118, or equivalent.

**MATH 222 Mathematical Analysis for Economics and
Business (4)****GEB B.2.**

Multivariate calculus. Lagrange multipliers, linear algebra and determinants. Differential and difference equations. 4 lectures. Prerequisite: MATH 221 or equivalent.

MATH 241 Calculus IV (4)**GEB B.2.**

Partial derivatives, multiple integrals, introduction to vector analysis. Miscellaneous course fee may be required in sections with a computer component—see *Class Schedule*. 4 lectures. Prerequisite: MATH 143.

MATH 242 Differential Equations (4)**GEB B.2.**

Ordinary differential equations: introduction with applications in engineering and science; classification of

equations and their analytic solutions; study of interrelationships between differential systems, graphs, and physical problems. Miscellaneous course fee may be required in sections with a computer component—see *Class Schedule*. 4 lectures. Prerequisite: MATH 241.

**MATH 248 Methods of Proof in
Mathematics (4)****GEB B.2.**

Methods of proof (direct, contradiction, conditional, contraposition); valid and invalid arguments. Examples from set theory. Quantified statements and their negations. Functions, indexed sets, set functions. Proofs in number theory, algebra, geometry and analysis. Proof by induction. Equivalence and well-defined operations and functions. The axiomatic method. 4 lectures. Prerequisite: MATH 143 or consent of instructor.

MATH 300 Microcomputers in Mathematics Education (3)

Examination of existing hardware and software designed for educational uses. Mathematical topics appropriate for computer enhancement. Special methods and techniques for educational uses of computers. Emphasis on activity learning and applications. Computer as a classroom management device. 2 lectures, 1 activity. Prerequisite: MATH 118, and CSC 110 or CSC 113 or CSC 207, or consent of instructor.

MATH 304 Vector Analysis (4)**GEB B.2.**

Algebra of free vectors with applications. Differential and integral calculus of vectors. Development of theory and application of vector operations. Green's Theorem, Stokes' Theorem, and the Divergence Theorem. Miscellaneous course fee may be required in sections with a computer component—see *Class Schedule*. 4 lectures. Prerequisite: MATH 241 or consent of instructor.

MATH 306 Linear Algebra II (4)**GEB B.2.**

Inner product spaces, orthogonality, Fourier series and orthogonal bases, linear transformations and similarity, eigenvalues and diagonalization. Miscellaneous course fee may be required in sections with a computer component—see *Class Schedule*. 4 lectures. Prerequisite: MATH 206, MATH 242, and MATH 248, or consent of instructor.

**MATH 317 Topics in Engineering
Mathematics (4)****GEB B.2.**

Fourier series, Fourier transforms and their properties. Introduction to generalized functions. Introductory probabilistic concepts encountered in data analysis and engineering. Miscellaneous course fee may be required in sections with a computer component—see *Class Schedule*. 4 lectures. Prerequisite: MATH 242.

**MATH 318 Advanced Engineering
Mathematics (4)****GEB B.2.**

Power series solutions of differential equations and Bessel functions. Fourier series and transforms; matrices. Miscellaneous course fee may be required in sections with a computer component—see *Class Schedule*. 4 lectures. Prerequisite: MATH 242.

¹ Each course in a combined listing of sequentially numbered courses is a prerequisite to its successor in the same listing.

¹ MATH 327, 328 Introduction to Modern Mathematics (4) (4) 328: GEB B.2.

Introduction to set theory, logic and proof, number theory, real numbers, geometry and trigonometry, probability and statistics. 4 lectures. Prerequisite: ELM requirement, and passing score on Mathematics Placement Examination, or MATH 118, or equivalent.

MATH 329 Mathematical Applications to Elementary Teaching (3)

Mathematical concept development in elementary school mathematics. Emphasis on activity learning and problem solving. Computer applications. 2 lectures, 1 activity. Prerequisite: MATH 328.

MATH 333 Numerical Analysis II (3) (Also listed as CSC 333)

Solution of systems of differential equations, predictor-corrector methods, stiff equations. Approximation methods: cubic splines, B-splines, Bezier curves, least squares, methods for solving boundary value problems. 3 lectures. Prerequisite: CSC 332 or equivalent.

MATH 335 Graph Theory (3)

Finite graphs, digraphs, Eulerian and Hamiltonian paths, matrix representation of graphs, connectedness, isomorphism, planarity, matching theory, network flow, trees, applications. 3 lectures. Prerequisite: Junior standing or consent of instructor.

MATH 336 Combinatorial Mathematics (3)

Selected topics from the field of enumerative combinatorics: permutations, combinations, generating functions, recurrence relations, inclusion and exclusion, Polya theory, block design. 3 lectures. Prerequisite: Junior standing or consent of instructor.

MATH 341 Theory of Numbers (4) GEB B.2.

Properties of numbers. Euclid's Algorithm, greatest common divisors, diophantine equations, prime numbers, congruences, number theoretic functions, the quadratic reciprocity laws, primitive roots and indices. 4 lectures. Prerequisite: MATH 248 or consent of instructor.

MATH 350 Mathematica (4)

Problem-solving using Mathematica in a UNIX environment. 4 lectures. Prerequisite: MATH 241.

MATH 370 Putnam Exam Seminar (2)

Directed group study of mathematical problem solving techniques. Open to undergraduate students only. Class members are expected to participate in the annual William Lowell Putnam Mathematical Competition. Course may be repeated up to eight units. 2 seminars. Prerequisite: Consent of instructor.

MATH 371 Math Modeling Seminar (2)

Directed group study of mathematical modeling techniques. Open to undergraduate students only. Class members are expected to participate in the annual Mathematical Competition in Modeling. Total credit limited to 8 units. 2 seminars. Prerequisite: Consent of instructor.

MATH 400 Special Problems for Advanced Undergraduates (1-4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units. Prerequisite: Junior standing and consent of department chair.

MATH 404 Introduction to Differential Geometry and Topology (4)

Theory of curves and surfaces in space. Topics such as curvature, geodesics, Gauss map, Gauss-Bonnet Theorem, combinatorial topology, point set topology. 4 lectures. Prerequisite: MATH 206 and MATH 304.

MATH 406 Linear Algebra III (4)

Complex vector spaces, unitary and self-adjoint matrices, Spectral Theorem, Jordan canonical form. Selected topics in linear programming, convexity, numerical methods, and functional analysis. Miscellaneous course fee may be required in sections with a computer component—see *Class Schedule*. 4 lectures. Prerequisite: MATH 306 or consent of instructor.

MATH 408 Functions of a Complex Variable (4)

Elementary analytic functions and mapping; Cauchy's Integral Theorem; Power series; theory of residues and evaluation of integrals; harmonic functions. 4 lectures. Prerequisite: MATH 242.

MATH 409 Complex Analysis (4)

Further development of analytic function theory. Additional topics in calculus of residues, conformal mapping and the Poisson Integral. 4 lectures. Prerequisite: MATH 408.

MATH 412 Advanced Calculus I (4)

Introduction to concepts and methods basic to real analysis. Topics such as the real number system, sequences, continuity, uniform continuity and differentiation. 4 lectures. Prerequisite: MATH 248 or consent of instructor.

¹ MATH 413, 414 Advanced Calculus II, III (4) (4)

A continuation of Advanced Calculus I covering such topics as integration, infinite series, uniform convergence and functions of several variables. Highly recommended for students planning to enter graduate programs or secondary teaching and those interested in applied mathematics. 4 lectures. Prerequisite: MATH 206 and MATH 412, or consent of instructor.

MATH 417 Introduction to Dynamical Systems (4)

Theory of dynamical systems in one and two dimensions. Topics such as bifurcation theory, chaos, attractors, limit cycles, nonlinear dynamics. 4 lectures. Prerequisite: MATH 242.

MATH 418 Partial Differential Equations (4)

Mathematical formulation of physical laws. Separation of variables. Orthogonal functions and generalized Fourier series. Bessel functions, Legendre polynomials. Sturm

¹ Each course in a combined listing of sequentially numbered courses is a prerequisite to its successor in the same listing.

Liouville problem. Boundary value problems; nonhomogeneous techniques. Applications to heat flow, potential theory, vibrating strings and membranes. Miscellaneous course fee may be required in sections with a computer component—see *Class Schedule*. 4 lectures. Prerequisite: MATH 318 or equivalent, or MATH 306 or MATH 317 with consent of instructor.

MATH 419 Introduction to the History of Mathematics (4)

Evolution of mathematics from earliest to modern times. Major trends in mathematical thought, the interplay of mathematical and technological innovations, and the contributions of great mathematicians. Appropriate for prospective and in-service teachers. 4 lectures. Prerequisite: MATH 248 and at least one upper division course in mathematics, or consent of instructor.

MATH 424 Organizing and Teaching Mathematics (4)

Organization, selection, presentation, application and interpretation of subject matter in mathematics. Introduction to current issues in mathematics education. For students who will be teaching in secondary schools. 4 lectures. Prerequisite: Senior standing or consent of instructor.

¹ MATH 431, 432 Mathematical Optimization I, II (3) (3)

Classical optimization. Maximum/minimum of functions, linear and nonlinear optimization problems, duality, constrained optimization. Model building and applications to various fields. 3 lectures. Prerequisite: MATH 206 or consent of instructor.

MATH 433 Numerical Analysis III (3) (Also listed as CSC 433)

Methods for solving special systems of equations. Iterative and direct methods. Solution of partial differential equations by the finite difference method. Method of characteristics. Methods for finding eigenvalues and eigenvectors including the QR method. 3 lectures. Prerequisite: CSC 332 or equivalent.

MATH 437 Game Theory (3)

Development of the mathematical concepts, techniques, and models used to investigate optimal strategies in competitive situations; games in extensive, normal, and characteristic form. 3 lectures. Prerequisite: MATH 206 or consent of instructor.

MATH 442 Euclidean Geometry (4)

Foundations of Euclidean geometry, finite geometries, congruence, similarities, polygonal regions, circles and spheres. Constructions, mensuration, the parallel postulate. Appropriate for prospective and in-service mathematics teachers. 4 lectures. Prerequisite: MATH 248.

MATH 443 Modern Geometries (4)

Non-Euclidean and projective geometries. Properties of parallels, biangles, Saccheri and Lambert quadrilaterals, angle-sum and area. Limiting curves, hyperbolic trigonometry, duality, perspectivity, quadrangles, fundamental theorems of projective geometry, conics. 4 lectures. Prerequisite: MATH 442.

MATH 459 Undergraduate Seminar (2)

Written and oral analysis and presentations by students on topics from mathematical modeling. 2 seminars. Prerequisite: MATH 206 and MATH 242.

¹ MATH 461, 462 Senior Project (3) (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 150 hours total time. Prerequisite: MATH 459.

MATH 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

¹ MATH 481, 482 Modern Algebra I, II (4) (4)

Fundamental algebraic structures and types of algebras, including operations within them and relations among them. Groups, rings and fields. 4 lectures. Prerequisite: MATH 248.

MATH 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

MATH 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

MATH 500 Individual Study (1-4)

Individual research or advanced study planned and completed under the direction of a departmental faculty member. Open only to graduate students demonstrating ability to do independent work. Prerequisite: Graduate standing and consent of department chair.

MATH 501, 502 Methods of Applied Mathematics I, II (4) (4)

Introduction to advanced methods of mathematics useful in the analysis of engineering problems. Theory of vector fields, Fourier analysis, Sturm-Liouville theory, functions of a complex variable. Selected topics in asymptotic analysis, special functions, perturbation theory. Not open to students in major or master's degree program in mathematics. 4 lectures. Prerequisite: MATH 318 or equivalent, and

¹ Each course in a combined listing of sequentially numbered courses is a prerequisite to its successor in the same listing.

graduate standing or consent of instructor. MATH 502: MATH 501.

MATH 510 Survey of Modern Mathematics (4)

Selected topics from the field of modern mathematics. Projective and synthetic geometry, topology, logic, matrices, vectors. Theory of games, probability, linear and modern algebra and convex sets. Boolean algebras, graph theory, Lattice theory, geometry of complex numbers. 4 seminars. Prerequisite: Graduate standing or consent of instructor.

MATH 520, 521 Applied Analysis I, II (4) (4)

Advanced mathematical methods of analysis in science and engineering, integrated with modeling of physical phenomena. Topics include applications of complex analysis, Fourier analysis, ordinary and partial differential equations. Additional topics to be drawn from perturbation methods, asymptotic analysis, dynamical systems, numerical methods, optimization, and the calculus of variations. 4 lectures. Prerequisite for applied Analysis I: MATH 408, MATH 412, MATH 418 and graduate standing, or consent of the instructor. Prerequisite for Applied Analysis II: MATH 520 and graduate standing, or consent of the instructor.

MATH 522 Applied Analysis III (4)

Selected topics in applied analysis. 4 lectures. Prerequisite: MATH 521 and graduate standing, or consent of the instructor.

MATH 530, 531 Discrete Mathematics with Applications I, II (4) (4)

Advanced mathematical methods of discrete mathematics with applications. Topics will include probability theory with generating functions, difference equations and number theory. Additional topics to be drawn from the theory of algorithms, coding theory, set theory, and the relation of discrete mathematics to complex analysis. 4 lectures. Prerequisite for MATH 530: MATH 481, MATH 306 and graduate standing, or consent of instructor. Prerequisite for MATH 531: MATH 530 and graduate standing, or consent of the instructor.

MATH 532 Discrete Mathematics with Applications III (4)

Selected advanced topics in discrete mathematics. These topics may include foundations, numerical and computational methods of discrete mathematics, finite geometries or current problems in discrete mathematics. 4 lectures. Prerequisite: MATH 531 and graduate standing, or consent of the instructor.

MATH 540 Introduction to Topology (4)

Basic ideas of general topology, metric spaces, homeomorphisms and the separation axioms. 4 seminars. Prerequisite: Satisfactory completion of the Graduate Written Examination in Analysis or consent of the Graduate Committee.

MATH 550 Real Analysis (4)

Introduction to Lebesgue measure and integration, convergence theorems, L_1 spaces, Radon-Nikodym theorem and Fubini's theorem. 4 seminars. Prerequisite: Satisfactory completion of the Graduate Written Examination in Analysis or consent of the Graduate Committee.

MATH 560 Field Theory (4)

Polynomial rings, field extensions, normal and separable extensions, automorphisms of fields, fundamental theorem of Galois theory, solvable groups, solution by radicals, insolubility of the quintic. 4 lectures. Prerequisite: Satisfactory completion of the Graduate Written Examination in Algebra or consent of the Graduate Committee.

MATH 580 Seminar (1-4)

Built around topics in advanced mathematics chosen according to the common interests and needs of the students enrolled. Each seminar will have a subtitle according to the nature of the content. Total credit limited to 12 units. 1-4 seminars. Prerequisite: Graduate standing and consent of instructor.

MATH 596 Thesis (3) (3)

Serious research endeavor devoted to the development, pedagogy or learning of mathematics. Prerequisite: Graduate standing and consent of instructor.

ME-MECHANICAL ENGINEERING

ME 134 Mechanical Systems (3)

An introduction to analysis, synthesis, design, and testing of mechanical systems, their components and instruments. 2 lectures, 1 laboratory.

ME 211 Engineering Statics (3)

Analysis of forces on engineering structures in equilibrium. Properties of forces, moments, couples, and resultants. Equilibrium conditions, friction, centroids, area moments of inertia. Introduction to mathematical modeling and problem solving. Vector mathematics where appropriate. 3 lectures. Prerequisite: MATH 241 (or concurrently), PHYS 131.

ME 212 Engineering Dynamics (3)

Analysis of motions of particles and rigid bodies encountered in engineering. Velocity, acceleration, relative motion, work, energy, impulse, and momentum. Further development of mathematical modeling and problem solving. Vector mathematics where appropriate. 3 lectures. Prerequisite: MATH 241, ME 211.

ME 221 Solar Energy (3)

GEB F.2.

Methods of utilizing solar energy. Energy concepts, collection and storage systems; greenhouse effect. Commercial and residential building applications. Solar power generation and recent technical developments. International achievements in solar energy with emphasis on solar energy application in developing countries for water purification and other life support functions. 3 lectures. Prerequisite: PHYS 121 or equivalent.

ME 234 Philosophy of Design (3)

General approach to the meaning of engineering design. Conceptual blocks, creativity, design process, design considerations and elements. Intended for transfer students as a substitution for ME 134. 3 lectures.

ME 236 Thermal Systems (3)

Fundamentals of measuring temperature, pressure, and other thermal-fluid parameters. Measurement principles including error analysis. Theory and practice of writing lab reports. 2

lectures, 1 laboratory. Prerequisite: CHEM 125, ENGL 114, PHYS 132.

ME 240 Additional Engineering Laboratory (1) (CR/NC)

Special assignments undertaken by students who need or wish to acquire abilities supplementary to their standard pattern of courses. Assignments must be primarily of shop or laboratory nature. Work is done by the student with a minimum of faculty supervision. Credit/No Credit grading only. 1 laboratory. Prerequisite: Consent of department head.

ME 302 Thermodynamics (3)

Properties and fundamental relations for processes involving substances and the transfer of energy. First and second laws of thermodynamics, irreversibility and availability. 3 lectures. Prerequisite: PHYS 132, ME 212.

ME 313 Heat Transfer (3)

Basic principles of heat transfer. Conduction, radiation, convection, and combined modes. 3 lectures. Prerequisite: ME 302 or CHEM 305, MATH 242, CSC 251.

ME 318 Mechanical Vibrations (4)

Free vibration, damping, transient and steady state response to forced vibrations. Engineering methods, single and multiple degrees of freedom. Experimental studies of the dynamic behavior of structures and machines. Instrumentation methods utilized in field and laboratory. 3 lectures, 1 laboratory. Prerequisite: MATH 318, ME 326, EE 201.

ME 326 Intermediate Dynamics (4)

Continuation of ME 212. Additional analysis of planar motion of rigid bodies with particular attention to the kinematics of mechanisms. Rotating reference frames. Introduction to three dimensional dynamics. 4 lectures. Prerequisite: MATH 242 (or concurrent), ME 212, CSC 251.

ME 328 Introduction to Design (4)

Design of machine parts by stress and deflection. Effects of fluctuating stresses and stress concentration. Design of shafts and other machine parts. Modern industrial design practice using standard components and design layout drawings. 3 lectures, 1 laboratory. Prerequisite: CE 204, CE 205, ETME 143, MATE 206, CSC 251, ME 212.

ME 329 Intermediate Design (4)

Design of mechanical equipment and systems using various machine elements and components such as threaded fasteners, power screws, springs, gears, bearings, clutches, etc. Decision modeling based on technical and economic feasibility. 3 lectures, 1 laboratory. Prerequisite: ECON 201, ME 318 (or concurrent), ME 328.

ME 341, 342 Fluid Mechanics (3) (3)

Fluid statics. Conservation equations of fluid dynamics. Viscous flow, boundary layer concepts, lift and drag, compressible flow, turbomachinery. ME 341: 3 lectures. Prerequisite: ME 212. ME 342: 3 lectures. Prerequisite: ME 341, CSC 251 or equivalent.

ME 343 Thermal Science Laboratory (1)

Heat transfer and thermodynamic experiments covering combined free convection and radiation, forced convection, heat exchanger, polytropic blowdown, steam turbine, and

refrigeration system. 1 laboratory. Prerequisite: ME 236, ME 313, ME 341.

ME 344 Thermal Engineering (4)

Power and refrigeration cycles. Ideal gas mixtures, psychrometry, combustion. Convection, condensation, boiling heat transfer. 4 lectures. Prerequisite: ME 313, ME 341.

ME 345 Fluid Mechanics Laboratory (1)

Planning, execution and reporting of fluid mechanics experiments involving flow measurement and control, conservation equations, pressure and velocity distributions, performance of turbomachines, dimensional analysis for lift and drag on airfoils or bearings. 1 laboratory. Prerequisite: ME 236, ME 342.

ME 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter.

ME 401 Stress Analysis (4)

Advanced strength of materials: behavior of disks, plates, and shells. Theory of elasticity. Energy methods. 3 lectures, 1 laboratory. Prerequisite: CE 206, MATH 318, ME 328 or consent of instructor.

ME 405 Mechatronics (4)

Microprocessor applications in machine control and product design. Applied electronics. Drive technology; transducers and electromechanical systems. Real-time programming. Mechatronic design methodology. 3 lectures, 1 laboratory. Prerequisite: EE 321, EE 361, ME 329.

ME 410 Experimental Methods in Mechanical Design I (4)

Bonded resistance strain gages for static and dynamic measurements; rosettes, bridge circuits, lead wire effects, special gages. Photoelastic and moiré fringe methods including birefringent coatings, shadow, and projection moiré. Applications in mechanical design and metrology. 3 lectures, 1 laboratory. Prerequisite: ME 328.

ME 412 Composite Materials Analysis and Design (4)

Behavior of unidirectional fiber composites. Properties of short-fiber composites, and orthotropic lamina. Analysis of laminated composites. Strength and hygrothermal behavior of composite materials. Structural optimization. 3 lectures, 1 laboratory. Prerequisite: AERO 330 or ME 328.

ME 415 Energy Conversion (4)

Engineering aspects of energy sources, conversion and storage. Topics selected from fossil fuel systems, nuclear power, thermoelectric systems, thermionic converters, fuel cells, magnetohydrodynamic generators, and geothermal, tidal, wind and ocean temperature energy conversion systems. 4 lectures. Prerequisite: ME 302.

ME 416 Ground Vehicle Dynamics and Design (4)

Design of ground vehicles for directional stability and control. Tire mechanics and their effects on vehicle performance. Simulation of vehicle dynamics using digital computer. Synthesis of steering mechanism and suspension

system. 2 lectures, 2 laboratories. Prerequisite: ME 318, ME 328.

ME 422 Mechanical Control Systems (4)

Modeling and analysis of mechanical control systems. Design of mechanical, hydraulic and fluid systems using block diagrams, root locus, Bode diagrams, and the digital computer. 3 lectures, 1 laboratory. Prerequisite: ME 318.

ME 423 Robotics: Fundamentals and Applications (4)

Introduction to robots and their types. Homogeneous transformations. Kinematic equations and their solutions. Motion trajectories, statics, dynamics, and control of robots. Robot programming. Actuators, sensors and vision systems. 3 lectures, 1 laboratory. Prerequisite: ME 326, ME 422.

ME 424 Design of Piping Systems (4)

Pipe specifications and pertinent codes. Valves, fittings, pumps and compressors. The transportation function of piping as related to power plants, refineries, slurry systems, pumping systems and drainage. Philosophy of system design. 3 lectures, 1 laboratory. Prerequisite: CE 205, CE 206, ME 342, CSC 251, MATE 306.

ME 428 Design (4)

Component and system design from global integration point of view of various design parameters, using real life problems. Techniques of brainstorming, decision making, PERT, feasibility studies. Industrial participation design program. Subsystem design involving gears, bearings, etc. 2 lectures, 2 laboratories. Prerequisite: ME 313, ME 329, ME 342, ENGL 218.

ME 431 Mechanical Design Techniques (4)

Comprehensive study of various design methods and techniques. Techniques used to explore various structural concepts such as prestressing, shaping, sizing, etc. Simulation of systems using digital computer. Design criteria identification of design parameters and constraints. 3 lectures, 1 laboratory. Prerequisite: ME 329.

ME 432 Petroleum Reservoir Engineering (4)

Types of reservoirs and reservoir rocks. Measurement and interpretation of physical properties of reservoir rocks and fluids porosity, permeability, compressibility, electrical resistivity, fluid saturation, viscosity, solution gas. Introduction to flow in porous media, reserve calculations and computer applications. 3 lectures, 1 laboratory. Prerequisite: ME 341.

ME 434 Enhanced Oil Recovery (4)

Primary, secondary, and tertiary (enhanced) oil recovery methods. Waterflooding, gas injection, steam injection, in-situ combustion, chemical flooding, miscible flooding. Performance calculations and computer applications in EOR. 4 lectures. Prerequisite: ME 342, ME 344.

ME 435 Drilling Engineering (4)

Theory and practice of oilwell planning, drilling, well logging, and completion applied to the development of new oil and gas production, from onshore and offshore fields. 4 lectures. Prerequisite: ME 329, ME 342.

ME 436 Petroleum Production Engineering (4)

Design and operation of surface and subsurface equipment required in oil production. Processes and systems involved are well pumping, gas lifting, acidizing, hydraulic fracturing, fluid gathering and storage, separation of oil, gas, water and sediment from produced fluid. Includes equipment used in enhanced oil recovery processes. 4 lectures. Prerequisite: ME 329, ME 342.

ME 438 Heat Exchanger Design (4)

Theory and application of numerical, analytical, and experimental methods to selected heat transfer problems. Application of principles of conduction, convection, condensation, and boiling heat transfer, stress, and vibrations to design of heat exchange equipment. 4 lectures. Prerequisite: ME 313, ME 342.

ME 440 Thermal System Design (4)

Design and optimization of thermal systems. Engineering economics, thermal component sizing, steady-state simulation, and optimization techniques applied to the design and performance analysis of thermal systems. 3 lectures, 1 laboratory. Prerequisite: ME 342, ME 344.

ME 443 Turbomachinery (4)

Performance characteristics of various types for liquids and for gases. Criteria for proper selection of type and main dimensions. Cavitation criteria. Gas turbine cycles and performance. Two-dimensional cascades. Axial flow turbines and compressors. Centrifugal compressors and radial-inflow turbines. 4 lectures. Prerequisite: ME 342, ME 344, MATH 318.

ME 444 Combustion Engine Design (4)

Application of design parameters to the various engine cycles. Aspects of the combustion processes. Energy conversion including losses and cooling. Static and dynamic loading. 3 lectures, 1 laboratory. Prerequisite: ME 344.

ME 445 Convective Heat and Mass Transfer (4)

Forced convection in laminar and turbulent flow, free convection, diffusion, combined heat and mass transfer. 4 lectures. Prerequisite: ME 342, ME 344.

ME 450 Solar Power Systems (4)

High and intermediate temperature systems for conversion of solar energy to mechanical power and heat. Thermal energy storage and total thermal energy system design. Recommended as a complement to ME 415. 3 lectures, 1 laboratory. Prerequisite: ME 313.

ME 456, 457, 458 HVAC System Design (4) (4) (4)

Individual and team project work (including computer simulation) in designing systems, selecting equipment, estimating energy consumption and operating cost for applications in: ME 456, industrial ventilation, exhaust and pollution control; ME 457, commercial and industrial refrigeration; ME 458, commercial and industrial heating and air conditioning. 2 lectures, 2 laboratories. Prerequisite: ME 341, ME 344 or ENVE 304, EE 201.

ME 459 Advanced Thermal Environmental Engineering (4)

Advanced topics in environmental control including psychrometric chart construction, direct contact transfer

processes, heat exchangers, and refrigeration fundamentals. 4 lectures. Prerequisite: CSC 251, ME 313, ME 344.

ME 461, 462 Senior Project (2) (3)

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 150 hours total time. Prerequisite: Senior standing, ME 344 and ME 329 (or concurrent).

ME 463 Undergraduate Seminar (1)

New developments, policies, practices, and procedures discussed through seminar mode. Codes of ethics and case studies interpretations through panel discussions by students. 1 seminar. Prerequisite: Senior standing, ME 344 and ME 329 (or concurrent).

ME 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 9 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

ME 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 laboratories. Prerequisite: Consent of instructor.

ME 487 Cooperative Education Experience (6)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Prerequisite: Sophomore standing and consent of instructor.

ME 497 Cooperative Education Experience (12)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Prerequisite: Sophomore standing and consent of instructor.

ME 500 Individual Study (1–3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Prerequisite: Consent of department head, graduate adviser and supervising faculty member.

ME 502 Stress Analysis (4)

Approximate methods of stress analysis with emphasis on the theory of the Finite Element Method. Rayleigh-Ritz approximate energy minimizations applied to one- and two-dimensional stress fields. 3 lectures, 1 laboratory. Prerequisite: ME 401, graduate standing or consent of instructor.

ME 517 Advanced Vibrations (4)

Vibration of complex engineering systems. Inertia and stiffness matrices. Natural frequencies and normal modes. Approximate solutions and computer techniques. Response to transient and periodic inputs. 3 lectures, 1 laboratory. Prerequisite: ME 318, CSC 251, graduate standing or consent of instructor.

ME 531 Acoustics and Noise Control (3)

Description of sound using normal modes and waves. Interaction between vibrating solids and sound fields. Sound absorption in enclosed spaces. Sound transmission through barriers. Applications in acoustic enclosures, room enclosures, room acoustics. Design of quiet machinery and transducers. 3 lectures. Prerequisite: ME 318, MATH 318.

ME 541 Advanced Thermodynamics (4)

Selected modern applications of thermodynamics which may include topics from: 1) equilibrium and kinetics as applied to combustion and air pollution, analysis and evaluation of techniques used to predict properties of gases and liquids, and 2) improvement of modern thermodynamic cycles by second law analysis. 4 lectures. Prerequisite: ME 342, ME 344 and graduate standing or consent of instructor.

ME 542 Dynamics and Thermodynamics of Compressible Flow (4)

Control volume analysis of fluid-thermo equations for one-dimensional, compressible flow involving area change, normal shocks, friction, and heat transfer. Two-dimensional supersonic flow including linearization, method of characteristics, and oblique shocks. One-dimensional constant area, unsteady flow, 4 lectures. Prerequisite: ME 342, ME 344, MATH 242, and graduate standing or consent of instructor.

ME 551 Mechanical Systems Analysis (4)

Various system modeling methods applied to mechanical systems. System stability studies and system optimization methods. 3 seminars, 1 laboratory. Prerequisite: Graduate standing or consent of instructor.

ME 552 Conductive Heat Transfer (3)

Theory of steady-state and transient conduction in isotropic and anisotropic media. Development of differential equations, solutions by series, transforms, Duhamel's Method, variational methods. 3 seminars. Prerequisite: ME 342, ME 344, MATH 318, and graduate standing or consent of instructor.

ME 553 Convective Heat Transfer (3)

Conservation of mass, momentum, and energy applied to laminar forced and free convection and turbulent flows. Differential, integral, and scale analysis solutions. 3 seminars. Prerequisite: ME 342, ME 344, MATH 318, and graduate standing or consent of instructor.

ME 554 Computational Heat Transfer (3)

Numerical solutions of classical, industrial, and experimental problems in conduction, convection, and radiation heat transfer. 3 seminars. Prerequisite: ME 552, ME 553, graduate standing or consent of instructor.

ME 587 Cooperative Education Experience (6)

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Prerequisite: Graduate standing and consent of instructor.

ME 597 Cooperative Education Experience (12)

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Prerequisite: Graduate standing and consent of instructor.

ME 599 Design Project (Thesis) (2) (2) (5)

Each individual or group will be assigned a project for solution under faculty supervision as a requirement for the master's degree, culminating in a written report/thesis. Prerequisite: Graduate standing.

MGT-MANAGEMENT**MGT 118 Introduction to Human Relations in Business (3)**

Small group dynamics, leadership, communication, motivation, and perception. The individual in the business organization. For non-Business majors. 3 lectures.

MGT 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

MGT 201 Principles of Management (3)

Management process involving organization, decision-making, and managerial activities fundamental to all management levels and functional areas. Application to business firms, governmental agencies, hospitals, benevolent groups, and colleges. For non-Business majors. 3 lectures.

MGT 206 Principles of Purchasing (3)

Purchasing function applied to manufacturing, retailing, and food-service institutions. Its interdependence with other functional areas of the organization. For non-Business majors. 3 lectures.

MGT 301 Production and Operations Management (4)

Introduction to operations management and production systems; production models. Planning and control in manufacturing. Quantitative methods and statistical techniques used in production systems management. 3 lectures, 1 activity. Prerequisite: MATH 131 or MATH 221, and STAT 211 or STAT 252, and junior standing.

MGT 310 History of Management, Labor and Capitalism in the U.S. (4)

Historical development of labor-management systems and human resource management practices including case studies. Evolution of union and non-union, private and

public sector workplaces. 4 lectures. Prerequisite: Junior standing.

MGT 311 Industrial Management (4)

Organization and functioning of management in industry. Planning, direction, and control of the business enterprise in terms of policy formation, organizational structure, finance, sales, procurement, plant location, facilities and production processes. 4 lectures. Prerequisite: Junior standing.

MGT 312 Organization and Management Theory (4)

Examination of the structural and configurational components of formal organizations. Analysis of management theory development, concepts of organizational processes and managerial strategies. Application of organizational and management imperatives to formal organizational structures and functions. 4 lectures. Prerequisite: Junior standing. Recommended: STAT 252.

MGT 313 Industrial Relations (3)

Functions of personnel and labor relations as they relate to the management of the human resources in the organization. Industrial relations theory and practice. For non-Business majors only. 3 lectures. Prerequisite: Junior standing.

MGT 314 Human Resources Management (4)

Personnel function as it relates to the management of the human resources of the organization. Survey of employee/employer relations, the work environment, employee development and labor relations. 4 lectures. Prerequisite: Junior standing.

MGT 316 Labor Relations (4)

Union organizing. Negotiation and administration of collective agreements. Simulation of bargaining, grievance, and arbitration processes. 4 lectures. Prerequisite: Junior standing.

MGT 317 Organizational Behavior (4)

Application of behavioral science concepts to management. Motivation, perception, communications, leadership style, group dynamics. Effectiveness: individual, interpersonal, team, intergroup and organizational. 3 lectures, 1 activity. Prerequisite: Junior standing. Recommended: STAT 252.

MGT 331 Organization Design and Analysis (4)

Organizational design strategies and constructs, environmental, technological, and behavioral imperatives influencing organizational objectives and structures; design modifications to accommodate industrial, governmental, and nonprofit organizational requirements. Diagnostic analysis approaches; causation analysis; alternative formulation and analysis; design optimization criteria and techniques. 4 lectures. Prerequisite: MGT 312 or consent of instructor.

MGT 332 International and Cross Cultural Management (4)

Impact of culture on multinational businesses. Problem-solving framework and managerial skills for dealing with cultural differences. Case studies, simulation, and fieldwork. 4 lectures. Prerequisite: MGT 312, MGT 317 and junior standing.

MGT 400 Special Problems for Advanced Undergraduates (1-4)

Individual investigation, research studies, or surveys of selected problems. Total credit limited to 4 units.

Prerequisite: Senior standing and consent of instructor.

MGT 406 Multinational Business Operations (4)

International dimensions of managerial decision-making for multinational business operations. Environmental factors which shape international business strategy. Economic, technological, functional areas of management, accounting, finance, and marketing within the business enterprise.

Complexities of global management strategy. Case studies and simulation. 4 lectures. Prerequisite: Senior standing and completion of all 300-level Business core courses.

MGT 410 Compensation (4)

Design and management of compensation systems. Job analysis, job evaluation, wage and salary surveys, incentive systems, gainsharing, benefit administration, pay equity and legal regulation. Simulation and case study development of a wage structure, pay level and individual raise policies, administrative controls, salary and program budgets. 4 lectures. Prerequisite: MGT 314 or consent of instructor.

MGT 413 Labor Law (4)

Federal and state labor policy as expressed in common law, relevant statutes, and executive orders. Effects upon labor, management, minorities, and the public. Current rules analyzed in a contemporary and historical context. Understanding important industrial relations and manpower problems. 4 lectures. Prerequisite: MGT 310 or consent of instructor.

MGT 414 Business Strategy and Policy Seminar (4)

Application of interdisciplinary skills to comprehensive short and long range strategy and policy formulation. Analysis of the interdependence between external environments and internal systems. Case studies from a general management point of view. Industry and company simulations. Group problem solving. Integrating course of the core curriculum. 4 seminars. Prerequisite: All 300-level Business core courses and senior standing.

MGT 415 Advanced Personnel Management (4)

Application of behavioral science knowledge and process skills to the major functional activities of human resource management. Analysis of cost consequences and net utility of human resource programs and innovations. Case studies integrating theoretical and applied human resource concepts, strategies and organizational practices. Application of behavioral science research methods to conduct a field audit of an existing human resource system. 4 lectures. Prerequisite: MGT 314, or consent of instructor.

MGT 417 Organization Development (4)

Analysis of development and trends in the field of organization development. Application of behavioral science knowledge and social technology to growth and change of organizations for the purpose of improving effectiveness. Problem diagnosis and facilitation skills. 4 seminars. Prerequisite: MGT 317 or consent of instructor.

MGT 430 Internship (2-8) (CR/NC)

Business internship to permit student to correlate experience and academic knowledge. Placement in a part-time, supervised work experience program in a government agency or private organization (entrepreneurship, partnership or corporation) as approved by the department head. The intern will function as an employee subject to all the duties and responsibilities of employees engaged in comparable work. 16 hours of work experience per quarter per two units of credit. Maximum of 8 units per quarter. Credit/No Credit grading only. Prerequisite: Junior standing.

MGT 440 Service Operations Management (4)

Principles and techniques of operations management applied to the management of service operations. Producing organizational success through offering reliable, dependable, readily available, and flexible customer service. 4 lectures. Prerequisite: MGT 301.

MGT 441 Operations Planning and Control (4)

Framework for operations planning and control. Management problems associated with controlling flows of material and inventory levels in manufacturing and distribution systems. 4 lectures. Prerequisite: MGT 301.

MGT 442 Purchasing and Materials Management (4)

Role and scope of the procurement function and concept of an integrated materials management process. Relations with functional departments. Purchasing structure and processes in business and service organizations. Global concept of international purchasing. Measuring purchasing performance. 4 lectures. Prerequisite: Junior standing.

MGT 445 Advanced Operations Management (4)

Advanced principles in operations management as applied to both manufacturing and service organizations. Product-service conversion systems, capacity planning and utilization, aggregate planning, scheduling and control, inventory management, and operations subsystem coordination with the organization's strategy. 4 lectures. Prerequisite: MGT 301, and senior standing.

MGT 461, 462 Senior Project (2) (2)

Selection and analysis of a problem under faculty supervision. Problems typical of those which graduates must solve in their fields of employment. Formal report is required. Minimum 120 hours total time. Prerequisite: MGT 461 for MGT 462.

MGT 470 Selected Advanced Topics (1-4)

Directed group study of selected topics for advanced undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1-4 lectures. Prerequisite: Consent of instructor.

MGT 475 Seminar in Managerial Consultation (4)

Management consulting in the private and public sectors. Analysis of substantive and process skills required to provide independent and objective advice to clients. Application of consulting knowledge and skills to real client problems and facilitation of change. 4 seminars. Prerequisite: MGT 312, MGT 314, MGT 317 or consent of instructor.

MGT 480 Employee Ownership, Profit Sharing and Leveraged Buyouts (4)

Applications in large and small, public and private, union and nonunion businesses. Study of ESOPs (Employee Stock Ownership Plans). Review of related theory and research including tax and financial implications and role in corporate takeovers. Impact on management, labor relations, and economic performance. 4 seminars. Prerequisite: Junior standing, MGT 314 or equivalent.

MGT 487 Seminar in Quality Management (4)

Principles and techniques of quality and performance management as applied to organizations in the private and public sector. Emphasis on competitive implications. Integrations of fundamental management techniques, existing improvement efforts, technical tools, and new management technologies focused on continuous organizational improvement. 4 seminars. Prerequisite: Senior standing, MGT 301.

MGT 488 Small Business Management (4)

Application of management knowledge and skills to the specific managerial problems involved in planning and operating the smaller company; growth strategies; the art of securing performance; changing the organization structure to match growth; recruiting and compensating new personnel. 4 seminars. Prerequisite: Senior standing.

MGT 489 Advanced Seminar in International Management (4)

Discussion and case analysis of integration of theoretical and applied managerial concepts, strategies, and organizational practices in: international and multinational organizations; administration of foreign operations; conflicts between domestic and international policies and practices; integration of cultural, technological, and organizational management imperatives in multinational and international operations. 4 seminars. Prerequisite: MGT 332 or consent of instructor.

MGT 500 Independent Study (1-4)

Advanced study planned and completed under the direction of a departmental faculty member. Open only to graduate students demonstrating ability to do independent work. Prerequisite: Formal petition with approval.

MIS-MANAGEMENT INFORMATION SYSTEMS**MIS 318 Modeling Systems (4)**

Model formulation and solution procedures. Structured and unstructured processes. Constructing models under uncertainty. Probabilistic processes in management planning. Tradeoffs in alternative courses of action. Deterministic and probabilistic models. Mathematical techniques in strategic planning. Game theory. Optimization and suboptimization in business models. 3 lectures, 1 laboratory. Prerequisite: Junior standing, STAT 252 or equivalent.

MIS 321 Management Information Systems (4)

Applications of computers in business and industry. Management information systems and integrated systems concepts. Data organizations, file processing, spreadsheets,

data base management, and expert systems. Data communication and distributed data processing. System development process and information resource management. Decision support systems and the relationship of the computer to the management decision process. 3 lectures, 1 activity. Prerequisite: CSC 120 and junior standing.

MIS 412 Information Management and Database Systems (4)

Overview of database management and modeling. Focuses on business applications. Treats flatfile, network, relational, and object-oriented systems. Provides analysis, design and implementation for flatfile, relational and object-oriented systems. 3 lectures, 1 activity. Prerequisite: CSC 203, CSC 345, MIS 321.

MIS 418 Advanced Quantitative Methods and Control in Business (4)

Quantitative controls and decision support as applied to the operations of business. For the senior student who needs operational knowledge for applications in business analysis and decision support. Development of decision support system. 3 lectures, 1 activity. Prerequisite: MIS 321.

MIS 419 Expert Systems Applications in Business (4)

Impact of expert systems on business. Concepts and methods of logical inference using a computer. Knowledge engineering and fuzzy systems. Structure and function of an expert system. Development of business expert systems. 3 lectures, 1 activity. Prerequisite: MIS 321.

MIS 422 Information Systems Analysis and Design (4)

System development methodology and logical database design. Determination of management information requirements. Hardware and software selection. Computer Aided Software Engineering (CASE), software development tools. System definition project. 3 lectures, 1 activity. Prerequisite: MIS 412.

MIS 425 Small Business Information Systems (4)

Information systems in a simulated small business environment. Collaborative learning with teams analyzing, designing and implementing accounting and management reporting software. Determine and implement organizational policies and procedures. Organizational productivity as contrasted to individual productivity. 3 lectures, 1 activity. Prerequisite: MIS 221; ACTG 224, ACTG 225 or consent of instructor.

MIS 432 Information Systems Design and Implementation (4)

Structured design techniques and database implementation. Input, process, and output control and presentation methods. Project management and control. Design and implementation of information systems. Computer Aided Software Engineering (CASE) tools and software quality and security assurance. Software implementation project. 3 lectures, 1 activity. Prerequisite: MIS 412, MIS 422.

MKTG-MARKETING**MKTG 204 Elements of Marketing (4)**

Overview of the marketing institutions and function of marketing in the economic, socio-cultural and political-legal environments. Not acceptable for credit toward Business

Administration degree. 4 lectures. Prerequisite: ECON 201 or ECON 221 or equivalent, or consent of instructor.

MKTG 301 Principles of Marketing (4)

Basic course in marketing that examines marketing's role in society and management of the product, promotion, pricing and channel strategies of the firm. Includes discussion of ethical issues in marketing. 4 lectures. Prerequisite: ECON 222, STAT 252, and junior standing.

MKTG 302 Marketing Research I (4)

Market planning and information systems, Bayesian decision analysis. Survey research design, secondary and primary data collection, measurement and scaling. Questionnaire design, attitude theory and measurement, statistical sampling theory and sampling design. Elementary data analysis, report writing. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 activity. Prerequisite: MKTG 301.

MKTG 303 Buyer Behavior (4)

Applied study of behavior that affects marketing decisions in both consumer and industrial markets. 4 lectures. Prerequisite: MKTG 301.

MKTG 305 Promotion Strategies (4)

Designing the promotion strategies of the firm, including advertising, personal selling, sales promotion, publicity and public relations. Communications media available; their uses and limitations. 4 lectures. Prerequisite: MKTG 301.

MKTG 401 International Marketing (4)

Marketing activities necessary to direct the flow of a company's goods and services to customers in global markets. 4 lectures. Prerequisite: MKTG 301 and senior standing.

MKTG 402 Marketing Research II (4)

Emphasizes market data analysis. Includes current marketing research techniques. Regression, conjoint, and multidimensional scaling analysis. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 activity. Prerequisite: MKTG 302 and junior standing.

MKTG 404 Services Marketing (4)

Service organizations such as banks, hotels, and hospitals and the distinctive approach required for marketing strategy which is unique to service companies. 4 lectures. Prerequisite: MKTG 301 and senior standing.

MKTG 405 Sales Management (4)

Management of the field sales force, including staffing, training, directing, evaluating and control of sales personnel. 4 lectures. Prerequisite: MKTG 301 and senior standing.

MKTG 406 Marketing Management (4)

Policymaking and decisionmaking applications in the planning, organizing, operating, controlling and evaluating of individual products and brands. Miscellaneous course fee required—see *Class Schedule*. 4 lectures. Prerequisite: MKTG 302, MKTG 303, and senior standing.

MKTG 412 Marketing Law (4)

Law of marketing from a comprehensive management perspective: products, channels, pricing, promotion and credit. Information on patents, copyrights and trademarks. 4

lectures including case analysis. Prerequisite: Senior or graduate standing, BUS 207 and BUS 404 recommended.

MKTG 450 Direct Marketing (4)

Direct response marketing including the use of mail, space advertising, radio and television media in marketing products and services to consumer and industrial markets. 4 seminars. Prerequisite: MKTG 302 and senior standing.

MKTG 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

MSC—MILITARY SCIENCE

MSC 111 Orienteering (2)

Principles of orienteering, basic map reading and compass skills; course running techniques applied in field orienteering events. Open to all students. 1 lecture, 1 activity.

MSC 112 Survival Training—Wilderness (2) (CR/NC)

Techniques of survival in a wilderness environment. Traps and snares, building fires, preparing plant and animal food, locating water, and first aid. Open to all students. Credit/No Credit grading only. 1 lecture, 1 activity.

MSC 116 Basic Military Skills (2)

Conducting and evaluating individual, squad, platoon, and company drill and ceremony skills. Conducting manual of arms, evaluating physical fitness principles. Conducting and evaluating physical fitness program. Techniques of rifle marksmanship. Open to all students. 1 lecture, 1 activity.

MSC 211 Current Military Affairs (2)

Organization and functions of the Department of Defense. Issues related to U.S. military affairs: selective service, arms control, nuclear weapons and alliances. Purpose of ROTC, military customs, the military as a profession. Open to all students. 2 lectures.

MSC 212 Basic Camp (1–7)

One to seven units of credit may be granted depending upon successful completion of training. Six weeks of training, Fort Knox, Kentucky. Travel pay and salary provided through the Military Science Department. No obligation. Camp graduates eligible to enroll in ROTC Advanced Program.

MSC 213 Mountaineering (2) (CR/NC)

Techniques of survival in a mountainous environment. Rappelling, hot and cold weather survival, basic mountaineering, and rope bridges. Open to all students. Credit/No Credit grading only. 1 lecture, 1 activity.

MSC 215 Leadership/Management Seminar (2)

Exploration of key, basic managerial and leadership concepts/techniques. Emphasis is on practical application with experiential learning situations demonstrating key leadership and management principles. Open to all students. 2 seminars.

MSC 225 Advanced Survival Techniques (2) (CR/NC)

Mastery of advanced survival skills including water survival, water crossings, expedient tools, weapons, and shelters.

Signaling, weather forecasting and survival medicine. Credit/No Credit grading only. 2 lectures. Prerequisite: MSC 112, MSC 213 or consent of instructor. Must be able to swim.

MSC 226 Advanced Orienteering (2) (CR/NC)

Continuation of MSC 111. Skills will be enhanced with emphasis placed on practical application. Credit/No Credit grading only. 1 lecture, 1 activity. Prerequisite: MSC or consent of instructor.

MSC 229 Ranger Challenge (2) (CR/NC)

Selection and preparation of the Ranger Challenge Team which will represent Cal Poly in military tactical skills competition. Includes rope bridging, orienteering, weapons knowledge, hand grenade accuracy, 10K road march with equipment, first aid, marksmanship, physical fitness and tactics. Credit/No Credit grading only. 1 lecture, 1 activity.

MSC 311 Leadership and Management (3)

Descriptive model of platoon leadership including personnel within a platoon and tasks of platoon leaders; major theories of leadership; instruction and practice in communication, human relations, organizational structure, power and influence, and management. 3 lectures.

MSC 312 Leader Communication Skills (3)

Principles and usage of verbal, nonverbal, and symbolic communications. Preparing, conducting, and evaluating training. Principles and techniques of meeting management; leadership counseling techniques; proper radio procedures. 3 lectures.

MSC 313 Tactical Military Operations (3)

Organization of the United States and Soviet land combat forces including tactical doctrine and equipment; organization of the modern battlefield; fundamentals of small unit tactics; planning, organizing and conducting small unit operations; fundamentals of land navigation. 3 lectures.

MSC 314 ROTC Advanced Camp (6) (CR/NC)

Six week summer training program required to achieve an Army commission. Testing and training as functional Army officers and determination of potential for service. Travel pay, room and board, and salary are provided by the U.S. Army. Held at Fort Lewis, Washington. Credit/No Credit grading only. Prerequisite: MSC 311, MSC 312, MSC 313, and consent of instructor.

MSC 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor.

MSC 411 Military Professionalism and Ethics (3)

Professional knowledge subjects including command and staff functions, personnel, training and logistics management, military correspondence and leadership counseling. Discussion of moral philosophy and values essential to the military profession. 3 lectures.

MSC 412 Military Justice (2)

Uniform code of military justice, including the court martial system, disciplinary measures, military crimes, search and seizure, apprehension and safeguarding evidence. Overview of the laws of war. 2 lectures.

MSC 413 Military Organizations and Management (2)

Planning and organizing military functions. Managing staff positions of responsibility. Cadets will be responsible for all coordination and execution of assigned projects. 2 lectures. Prerequisite: MSC 411, MSC 412 and consent of instructor.

MSC 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 lectures. Prerequisite: Consent of instructor.

MU–MUSIC

MU 100 Music Fundamentals (3)

Traditional music notation. Use of treble and bass staff for pitch and rhythm, harmonization using principal triads, major and minor, and common seventh chords. Performance of simple pieces individually and in groups using common classroom instruments. 2 lectures, 1 activity.

MU 101 Introduction to Music Theory (3) GEB C.2.

For the non-music major. Introduction to the elements of music and their use by composers and performers. Intended for students with little or no prior musical experience in music theory. Notation of pitch and rhythm, scales, intervals and chords. 3 lectures.

MU 102 Acoustic Communication (3)

Exploring aspects of sound for communication, sound in our society. Effect and implications of technology on sound and contemporary music. Interrelationship of acoustic space and musical creation. 3 lectures. Prerequisite: Music major or consent of instructor.

MU 103 Music Theory I (3)

Structure of tonality in music of Western civilizations, four-part writing of root position and inverted triads, cadences and melodic structure, harmonic progressions, harmonization of a melody and nonharmonic tones, and seventh chords. 3 lectures. Prerequisite: Music major or minor or permission of instructor.

MU 104 Musicianship I (1)

Introductory sight-singing; rhythmic dictation and performance in simple meters; identification of melodic and harmonic intervals and root position triads; dictation of triadic major melodies. 1 activity. Prerequisite: Music major or minor status.

MU 105 Music Theory II (3)

Continuation of MU 103. Includes secondary dominants, nondominant seventh chord, basic modulation, change of mode. Augmented sixth chord, and Neapolitan sixth chord. 3 lectures. Prerequisite: MU 103.

MU 106 Musicianship II (1)

Sightsinging in the minor mode; rhythmic dictation and performance in compound meters; identification of intervals beyond the octave and triad inversions; dictation of triadic pure minor melodies. 1 activity. Prerequisite: MU 104 or consent of instructor.

MU 120 Music Appreciation (4) GEB C.2.

Exploration of the world of music with emphasis on Western tradition. Language of music, the role of music in society. The works of major composers from the Renaissance to the present. 3 lectures, 1 activity.

MU 121 Introduction to World Music (3)

A survey of selected world musical cultures. Emphasis on listening to and understanding music from different societies. 3 lectures. Prerequisite: Music majors or consent of instructor.

MU 150 Applied Music (1)

Individual instruction in performance with emphasis on repertoire, technical skills, style, and interpretation. Total credit limited to 3 units. Specific areas of study are listed in the *Class Schedule*. Prerequisite: Consent of instructor.

MU 151 Beginning Piano (2)

Beginning piano for student with no background in keyboard instruments. Includes fundamentals of notation, keyboard techniques, tone production, sightreading and facility. 1 lecture, 1 activity.

MU 152 Keyboard Skills I (1)

Continuation of MU 151. Piano for students with the ability to play a simple Bach or Mozart Minuet. Total credit limited to 3 units. 1 activity. Prerequisite: MU 151 or equivalent. For non-music majors.

MU 153 Keyboard Skills II (1)

Continuation of MU 152. Students are expected to play at the level of the easier Clementi Sonatinas. Total credit limited to 3 units. 1 activity. Prerequisite: MU 152 or one year of piano instruction. For non-music majors.

MU 154 Beginning Voice (1)

Beginning study of vocal and performance technique for the untrained singer. Total credit limited to 3 units. 1 activity.

MU 155 Guitar I (1)

Fundamentals of guitar technique and performance including elements of both classical and folk guitar. Designed to meet the needs of the public school teacher. No previous experience necessary. 1 activity.

MU 161 Piano Skills I (1)

Preparation for Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization or a melody, accompanying, improvisation of a melody. 1 activity. Prerequisite: Consent of instructor.

MU 162 Piano Skills II (1)

Continuation of MU 161. Preparation for Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, improvisation of a melody. 1 activity. Prerequisite: MU 161 or consent of instructor.

MU 163 Piano Skills III (1)

Continuation of MU 162. Preparation for Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, improvisation of a melody. 1 activity. Prerequisite: MU 162 or consent of instructor.

MU 170 University Jazz Band (1)

Limited to those who have had considerable experience playing musical instruments. Students have an opportunity to play for various university functions, dances, community programs, the annual Spring Tour and the Jazz Night concert. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

MU 171 Instrumental Ensembles (1)

Open to qualified musicians. Rehearsal and public performances in large and small ensembles. Total credit limited to 6 units. 1 activity. Prerequisite: Consent of instructor.

MU 172 Band (1)

Study and public performance of music written for large wind bands (woodwinds, brass, and percussion). Limited to those students who have had experience with wind and percussion instruments. The band performs concerts on campus and makes at least one tour annually. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

MU 173 Wind Ensemble (1)

Study and public performance of music written for wind ensembles (woodwinds, brass and percussion). Limited to those students who have had experience with wind and percussion instruments. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

MU 174 Orchestra (1)

Preparation and performance of orchestral music including both the standard repertoire and rarely performed works. Open to all students whose technique is adequate. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

MU 180 Men's Chorus (1)

Study and public performance of music composed for men's voices. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

MU 181 University Singers (1)

Study and public performance of music for mixed voices. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

MU 182 Women's Chorus (1)

Study and public performance of music composed for women's voices. Total credit limited to 6 units. 1 laboratory. Prerequisite: Consent of instructor.

MU 183 Vocal Ensemble (1)

Open to qualified singers. Rehearsal and performance of vocal music. Total credit limited to 6 units. 1 activity. Prerequisite: Consent of instructor.

MU 184 Music Production Workshop (2)

Preparation of a musical theatre production for public presentation. Includes acting and stage management. Total credit limited to 6 units. 2 laboratories. Prerequisite: By audition or consent of instructor.

MU 201 Music Theory III (3)

Compositional procedures employed by composers of the Classical and Romantic periods. Chromatic third-related harmony, ninth, eleventh and thirteenth chords. Chromatic modulation. 3 lectures. Prerequisite: MU 105.

MU 205 Music Recording Techniques I (3)

Equipment and basic techniques for recording music. Understanding recording technology. Analysis and projects in recording. 2 lectures, 1 activity. Prerequisite: Permission of instructor.

MU 206 Jazz and Popular Music Arranging (3)

Beginning techniques for combo and big band arranging. Arrangement planning, sketch scores, full scores, transpositions, part preparation and copying included. Arrangements will be played by University groups. 3 lectures. Prerequisite: MU 105 or equivalent and consent of instructor.

MU 208 Musicianship III (1)

Sightsinging in the melodic and harmonic minor mode; rhythmic dictation in 2 parts; identification of triadic chord progressions and root position seventh chords; dictation of melodic and harmonic minor melodies. 1 activity. Prerequisite: MU 106 or consent of instructor.

MU 210 Musicianship IV (1)

Continuation of MU 208. Sightsinging with chromatic tones; rhythmic performance in irregular meters; chord progressions with triads and dominant seventh chords; seventh chord inversions; and 2-part diatonic dictation. 1 activity. Prerequisite: MU 208 or consent of instructor.

MU 211 Musicianship V (1)

Continuation of MU 210. Sightsinging with non-diatonic tones; rhythmic dictation in irregular meters; chord progressions with secondary dominant chords; modulatory progressions and dictations. 1 activity. Prerequisite: MU 210 or consent of instructor.

MU 212 Musicianship VI (1)

Continuation of MU 211. Emphasis on previously acquired skills, plus performance and dictation of complex beat divisions; identification of augmented and neapolitan 6th chords; and modulatory dictation in 2 parts. 1 activity. Prerequisite: MU 211 or consent of instructor.

MU 221 Jazz Styles (3)**GEB C.3.**

Survey of jazz as a significant American art form from 1917 to the present; its historical background and development in the United States. Big bands, combos, and soloists. Extensive use of recordings and live presentations. 3 lectures.

MU 222 History and Theory of Jazz (3)

Survey of jazz styles. Emphasis on historical context and development of jazz through study and analysis of scores. 3 lectures. Prerequisite: MU 201.

MU 250 Applied Music (1)

Individual instruction in performance with emphasis on repertoire, technical skills, style, and interpretation. Total credit limited to 3 units. Specific areas of study are listed in the *Class Schedule*. Prerequisite: 3 units of MU 150 and consent of instructor.

MU 251 Diction for Singers (1)

The study of diction as it applies to singing in English, French, German, Italian and Spanish. 1 activity. Prerequisite: Consent of instructor.

MU 252 Intermediate Voice (1)

Vocal and performance technique for experienced singers. Total credit limited to 3 units. 1 activity. Prerequisite: MU 154 or consent of instructor.

MU 253 Keyboard Skills III (1)

Intermediate level piano techniques with emphasis on style, interpretation, sightreading, basic performance practices and the solution to general musical problems. Total credit limited to 3 units. 1 activity. Prerequisite: MU 153 or consent of instructor. For non-music majors.

MU 255 Guitar II (1)

Fundamentals of guitar technique and performance including elements of both classical and folk guitar. Knowledge of basic chords and/or standard note reading on guitar required. 1 activity. Prerequisite: MU 155 or permission of instructor.

MU 259 Jazz Improvisation (1)

Application of scales and their relationship to chords, including modes, phrasing, blues progressions, and cycle of dominant seventh chords, melodic construction in improvisation. Basic jazz keyboard skills and ear training. Repeatable to 3 units. 1 activity. Prerequisite: Consent of instructor.

MU 261 Piano Skills IV (1)

Continuation of MU 163. Preparation for Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, and improvisation of a melody. 1 activity. Prerequisite: MU 163 or consent of instructor.

MU 262 Piano Skills V (1)

Continuation of MU 261. Preparation for Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, improvisation of a melody. 1 activity. Prerequisite: MU 261 or consent of instructor.

MU 263 Piano Skills VI (1)

Continuation of MU 262. Successful completion of this course represents fulfillment of the Piano Proficiency Examination. Study of piano repertoire, sightreading, transposition, harmonization of a melody, accompanying, improvisation of a melody. 1 activity. Prerequisite: MU 262 or consent of instructor.

MU 301 Counterpoint (3)

Counterpoint as a compositional technique. Modal, tonal, and post-tonal practices. 3 lectures. Prerequisite: MU 201.

MU 302 Music Theory IV (3)

Transition to the twentieth century. Expanded tonality, chromaticism, new tonal freedom, expanded chord vocabulary, parallelism and form in impressionism. 3 lectures. Prerequisite: MU 201.

MU 304 Introduction to Music Synthesis (3)

Survey of equipment and techniques for synthesizing music, and instrumental timbres. Development of basic skills in programming synthesis equipment and manipulating sonic material. 2 lectures, 1 activity. Prerequisite: Permission of instructor.

MU 305 Music Recording Techniques II (4)

Advanced techniques for recording music, signal processing, and the relationship of sound spaces and the recording process. Development of practical recording methods. 2 lectures, 2 activities. Prerequisite: MU 205.

MU 306 Advanced Music Synthesis (3)

Compositional application of sound synthesis techniques. Exploration of current topics in music synthesis. Total credit limited to 6 units. 1 lecture, 2 activities. Prerequisite: MU 205, MU 304 and consent of instructor.

MU 320 Music Research and Writing (3)

Methodology for researching, analyzing, and writing about music. Exploration of investigative tools including library resources, periodicals, bibliographic tools, computerized search methods. Computer software for writing text, music notation, and music printing. Editing and formatting for music publication. 3 lectures. Prerequisite: ENGL 114, MU 120.

MU 321 History of Music I (3)

Survey of the history of Western music from Antiquity through the Renaissance. 3 lectures. Prerequisite: MU 105 and MU 120.

MU 322 History of Music II (4)

Music of the Baroque, Classic and Romantic periods. 4 lectures. Prerequisite: MU 321.

MU 323 History of Music III (3)

Music of the 20th Century. 3 lectures. Prerequisite: MU 322.

MU 324 Music and Society (3) GEB C.3.

Designed for the non-music major. Exploration into the role of music in history and culture. Emphasis on appreciation and a deeper understanding of music and both its historical and cultural context. *Class Schedule* will list topics selected. Total credit limited to 9 units. 3 lectures. Prerequisite: Junior standing. MU 120 recommended.

MU 325 America's Music (3)

Exploration of the many styles of America's music through readings, sound recordings, and musical scores. Includes "fine art," "popular," and "folk" traditions. How American music reflects the different cultural heritages, social contexts, and philosophies of its creators. 3 lectures. Prerequisite: MU 103, MU 120.

MU 326 Cultural Concepts and Structures in Music (3)

Concepts and structures of music in non-western and avant-garde musical cultures. Emphasis on understanding the theory and compositional procedures in selected musical

genres. Projects in analysis and composition. 3 lectures. Prerequisite: MU 105.

MU 327 Concert Attendance (London) (1) GEB C.3.

Concert attendance for Music and Society (MU 324) course taught in London. Must be taken in conjunction with MU 324. Miscellaneous course fee required—see *Class Schedule*. 1 activity. Prerequisite: Junior standing. MU 120 recommended.

MU 340 Conducting (3)

Principles and techniques of conducting with experience in score reading. 2 lectures, 1 activity. Prerequisite: MU 201.

MU 341 Choral Conducting (3)

Continuation of MU 340. Emphasis on choral literature. Score reading, rehearsal techniques, and musical details associated with vocal music. 2 lectures, 1 activity. Prerequisite: MU 340.

MU 342 Instrumental Conducting (3)

Continuation of MU 340. Emphasis on band and orchestra literature. Score reading, rehearsal techniques, and musical details associated with instrumental music. 2 lectures, 1 activity. Prerequisite: MU 340.

MU 350 Applied Music (1)

Individual instruction in performance and composition. Total credit limited to 3 units. Specific areas of study are listed in the *Class Schedule*. Prerequisite: Consent of instructor.

MU 360 Music for Children (3)

Development of skills basic to fostering creative music experiences in the classroom. Exploration of various approaches to motivating children musically. Study of folk songs for singing, playing instruments, and learning about music as well as for their ethnic and cultural significance. 3 lectures. Prerequisite: MU 100.

MU 361 Instruments (1)

Fundamentals of playing and teaching woodwind, brass, string, and percussion instruments. Separate sections arranged with instructor. Total credit limited to 6 units. 1 activity. Prerequisite: Junior standing and consent of instructor.

MU 365 Music in the Elementary School (3)

Study and application of Orff and Kodaly. Philosophy and objectives for implementing an effective school music program. Includes fieldwork. 2 lectures, 1 activity. Prerequisite: Junior standing.

MU 370 University Jazz Band (1)

Limited to those who have had considerable experience playing musical instruments. Students have an opportunity to play for various university functions, dances, community programs, the annual Spring Tour and the Jazz Night concert. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

MU 371 Instrumental Ensemble (1)

Open to qualified musicians. Rehearsal and public performance in large and small ensembles. Total credit limited to 6 units. 1 activity. Prerequisite: Junior standing and consent of instructor.

MU 372 Band (1)

Study and public performance of music written for large wind band (woodwinds, brass and percussion). Limited to those students who have had experience with wind and percussion instruments. The band performs concerts on campus and makes at least one tour annually. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

MU 373 Wind Ensemble (1)

Study and public performance of music written for wind ensemble (woodwinds, brass and percussion). Limited to those students who have had experience with wind and percussion instruments. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

MU 374 Orchestra (1)

Preparation and performance of orchestral music including both the standard repertoire and rarely performed works. Open to all students whose technique is adequate. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

MU 380 Men's Chorus (1)

Study and performance of music for men's voices. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

MU 381 University Singers (1)

Study and public performance of music for mixed voices. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

MU 382 Women's Chorus (1)

Study and public performance of music for women's voices. Total credit limited to 6 units. 1 laboratory. Prerequisite: Junior standing and consent of instructor.

MU 383 Vocal Ensemble (1)

Open to qualified singers. Rehearsal and performance of vocal music. Total credit limited to 6 units. 1 activity. Prerequisite: Junior standing and consent of instructor.

MU 384 Music Production Workshop (2)

Preparation of a musical theatre production for public presentation, including acting and stage management. Total credit limited to 6 units. 2 laboratories. Prerequisite: Junior standing and by audition, or consent of instructor.

MU 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Junior standing and consent of department head.

MU 401 Contemporary Music Theory (3)

Harmonic, melodic, and rhythmic styles and trends of contemporary music. Includes modality, polytonality, quartal harmony, and serial techniques. 3 lectures. Prerequisite: MU 302.

MU 402 Orchestration (3)

Scoring and arranging for various combinations of instruments. Ranges, transposition, and technical capabilities of vocal ensembles, band, and orchestra instruments. 3 lectures. Prerequisite: MU 201.

MU 404 Composition (3)

Independent creative projects. Exercises in compositional methods designed to increase technical facility. Total credit limited to 9 units. 3 lectures. Prerequisite: MU 302 and permission of instructor.

MU 420 Music History: Selected Topics (3)

Intensive study of selected topics in music history through the use of readings, recordings, and scores. *Class Schedule* will list topics selected. Total credit limited to 9 units. 3 lectures. Prerequisite: MU 323.

MU 450 Applied Music (1)

Individual instruction in performance and composition. Total credit limited to 3 units. Specific areas of study are listed in the *Class Schedule*. Prerequisite: Consent of instructor.

MU 461 Senior Project (3)

Selection and completion of a project under faculty supervision. Minimum of 90 hours total time. Results presented in a recital, creative work, formal report, or a combination of all three. Prerequisite: Senior standing and consent of department head.

MU 465 Choral Literature and Rehearsal Techniques (3)

Survey of choral literature especially suited for secondary schools. Philosophy and strategy for developing a school program. Musical as well as non-musical techniques for effective rehearsal. 2 seminars, 1 activity. Prerequisite: MU 341.

MU 466 Instrumental Literature and Rehearsal Techniques (3)

Survey of instrumental literature especially suited for secondary schools. Philosophy and strategy for developing a school program. Musical as well as non-musical techniques for effective rehearsal. 2 seminars, 1 activity. Prerequisite: MU 342.

OH-ORNAMENTAL HORTICULTURE**OH 110 Orientation to Environmental Horticultural Science (1) (CR/NC)**

Understanding the depth and breadth of the environmental horticulture industry, the department, and the University. Student and professional organizations, equipment safety and operation. Required of all students in the major. Credit/No Credit grading only. 1 laboratory.

OH 121 Fundamentals of Environmental Horticulture I (4)

Introduction to environmental horticulture. Growing operations; cultural practices, including soil, media, effect, and control of environment. Field trip required. 3 lectures, 1 laboratory.

OH 122 Fundamentals of Environmental Horticulture II (4)

Aesthetic aspects of environmental horticulture, including landscape drafting, landscape and floral design and history. Design in the use and presentation of environmental products. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: OH 110, OH 121.

OH 123 Landscape Installation and Maintenance (2)

Planting and maintenance of trees, shrubs, ground covers, and small turf areas. Site selection, cultural requirements, scheduling of maintenance activities, pruning and fertilizing. Equipment maintenance, safety and operation. 1 lecture, 1 laboratory. Prerequisite: OH 110, OH 121.

OH 124 Plant Propagation (4)

Plant propagation practices with emphasis on understanding why practices are used, how they work, and how applied in commercial horticulture. 3 lectures, 1 laboratory. Prerequisite: OH 110, OH 121.

OH 125 Florist Practices I (3)

Fundamentals of theory, techniques and skills currently practiced in the florist industry. Intended as consumer education for non-majors as well as initial preparation for pre-professionals. Includes applied art principles, post-harvest care and handling practices, and proper use of florist tools and materials in crafting basic designs. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories.

OH 126 Environmental Horticulture Construction (2)

Design, construction and repair of structures and facilities unique to the environmental horticulture industry. Materials, tools, equipment, and machinery used. 1 lecture, 1 laboratory.

OH 200 Special Problems for Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total graduation credit limited to 4 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

OH 210 Enterprise Project I (1–4)

Selection and completion of a management/production project under faculty supervision. Project participation is voluntary and subject to approval by the department head and the Cal Poly Foundation. Degree credit limited to two units. Credit/No Credit grading only. Prerequisite: OH 110, OH 121, OH 124.

OH 221 Water Issues and Delivery Systems (3)

Water issues as they relate to the environmental horticulture industry. Water management, conservation, and quality. Methods and evaluation of water delivery. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisites: OH 121, OH 122, OH 123, OH 124, CHEM 121.

OH 222 Abiotic Plant Problems (3)

Diagnosing of plant problems associated with environmental, nutritional, and physiological factors. Particular emphasis on the systematic inquiry process. Case histories, multimedia

use. 2 lectures, 1 laboratory. Prerequisite: OH 122, OH 123, OH 124, SS 221.

OH 225 Florist Practices II (3)

Expanded exploration and application of design theory to commercial products and services in the retail florist industry. Appropriate utilization of current sales and business practices in a florist setting. Advanced techniques and skills for construction of wedding, sympathy, holiday and gift floral designs. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories. Prerequisite: OH 125.

OH 230 Ornamental Gardening (3)**GEB F.2.**

Information and recommendations for the home gardener. Methods of propagation, pruning, planting, soils, fertilizers, lawn planting and maintenance, pest and weed control, home landscaping, and identification and care of house plants. For non-horticulture majors. 2 lectures, 1 laboratory.

OH 231, 232 Plant Materials (4) (4)

Identification, habits of growth, cultural requirements, and use of ornamental plants in the landscape. Field trip required. 3 lectures, 1 laboratory. Prerequisite: BOT 121. OH 231 prerequisite for OH 232.

OH 243 Turf Management (4)

Turf propagation, irrigation, fertilizer and pest control methods and procedures. Turf grass varieties and uses. Turf equipment. 3 lectures, 1 laboratory. Prerequisite: OH 123, OH 221, SS 121.

OH 301 Principles of Landscape Horticulture (3)

Introduction to principles and elements of residential landscape horticulture, design theory, plant composition; creative problem solving, functional and design uses of landscape materials, client and maintenance criteria, xeriscape concepts and perspective drawing. Expansion of drafting skills and development of computer-aided design skills. Miscellaneous course fee required—see *Class Schedule*. 1 lecture, 2 laboratories. Prerequisite: OH 122, OH 123, OH 126, OH 231 and AG 250 or CSC 110.

OH 302 Wholesale Marketing Systems for Ornamental Horticulture Crops and Services (3)

Types of environmental horticulture marketing channels. Concepts, principles and practices in sales, service and marketing of environmental horticulture products at wholesale levels. The role of customer relations. Forms of advertising. Inventory control and gross margins. International wholesale marketing. Field trip required. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 activity. Prerequisite: OH 121, OH 122, OH 123, ACTG 211.

OH 310 Enterprise Project II (2–4) (CR/NC)

Selection and completion of a management/production project under faculty supervision. Project participation is voluntary and subject to approval by the department head and the Cal Poly Foundation. Degree credit limited to two units. Maximum degree credit for OH 210 and OH 310 limited to four units. Credit/No Credit grading only. Prerequisite: OH 210 or consent of instructor.

OH 315 Advanced Plant Materials (3)

Identification, habits of growth, cultural requirements and use of specialty plant groups. Testing for knowledge of plants covered in required prerequisites. Field trip required. Miscellaneous course fee required—see *Class Schedule*. 3 lectures. Prerequisite: OH 231, OH 232.

OH 320 Horticultural Presentation Techniques (4)

Computer Assisted Design Drafting (CADD) applications for horticultural business. Exposure to various media essential to horticultural presentations. Expanded computer applications for plan, elevation, and perspective drawings. Exposure to estimating, plant materials database and plant selection programs. Required field trip. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: Computer literacy course; OH 122.

OH 321 Residential Landscape Design (4)

Principles of landscape design for single-family residential properties. Project involvement includes actual client contact. Application of xeriscape concepts. Computer assisted design applications emphasized. Required field trips. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: OH 231, OH 232, OH 301. Recommended: OH 320, OH 381, AE 237.

OH 324 Foliage Plant Culture (4)

Identification, propagation, production, marketing, utilization and maintenance of plants intended for interior plantscaping. 3 lectures, 1 laboratory. Prerequisite: Junior standing or consent of instructor.

OH 325 Floriculture Grades and Standards (3)

Grades and standards for fresh flowers, and blooming and foliage plants. Score cards in evaluating florist crops. Comparative evaluation used to develop both verbal skills and appreciation of commercially grown floriculture crops. 1 lecture, 2 laboratories. Prerequisite: OH 121, or consent of instructor.

OH 331 Landscape Contracting (4)

Practices in supervising personnel and applying standard techniques in landscape construction. Cost finding and estimating for landscape trades. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: OH 122, OH 126, OH 301.

OH 332 Landscape Contracting (4)

Practices in supervising personnel and applying standard techniques in landscape construction cost finding and estimating for landscape trades. Rules, regulations, and licensing laws, set forth by the State of California, governing landscape contractors. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: OH 331.

OH 333 Sport and Recreational Turf (4)

Maintenance and operation of large areas such as golf greens, athletic fields, and park areas. Systems of management and maintenance, business aspects, and turf industry. 3 lectures, 1 laboratory. Prerequisite: OH 243, SS 221.

OH 337 Park Planning and Management (4)

Overview of the management and maintenance of private and public parks and recreational areas. Field trips required. 3 lectures, 1 laboratory. Prerequisite: Junior standing or consent of instructor.

OH 340 Principles of Greenhouse Environment (4)

Analysis of problems and practices affecting the contemporary commercial horticulturist. Analysis and operation of greenhouses and related equipment stressing the effect of environment on plant growth. Field trip required. 3 lectures, 1 laboratory. Prerequisite: OH 121, or consent of instructor.

OH 341 Cut Flower Production (4)

Production of cut flowers and other fresh florists' commodities in greenhouses and outdoors. Preparation and scheduling of such commodities for major markets. Field trip required. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: OH 340 and consent of instructor.

OH 342 Potted Plant Production (4)

Production of major commercial flowering potted plants in greenhouses and outdoors. Preparation and scheduling of potted flowering greenhouse crops for major markets. Field trip required. 3 lectures, 1 laboratory. Prerequisite: OH 340 or consent of instructor.

OH 381 Native Plants for California Landscapes (3)

Horticultural investigation of the California flora with emphasis on landscape use and potential. Plant recognition, identification, propagation and culture. Utilization of native plants in landscape design and habitat restoration. Field trip required. 2 lectures, 1 laboratory. Prerequisite: BOT 121, junior standing or consent of instructor.

OH 400 Special Problems for Advanced Undergraduates (1–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

OH 401 Field Studies in Ornamental Horticulture (1)

Field trips to ornamental horticulture outlets and the industry businesses that supply them. Garden centers, flower shops and garden center flower shop combinations. Foundation and display gardens with retail outlets and public educational facilities. Required field trip includes wholesalers, jobbers, display houses, advertising agency and others working with the retailers. 1 activity. Prerequisite: OH 121.

OH 402 Retailing Horticultural Products (4)

Economics of operating and managing retail horticulture outlets. Location, selection, layout, and demographic studies. Personnel management, merchandising, advertising, pricing strategies and selling techniques, cooperative buying and industry contributions. 3 lectures, 1 laboratory. Field trip required. Prerequisite: OH 121, OH 122, ECON 201 or ECON 211, junior standing or consent of instructor. Recommended: MGT 201.

OH 421 Arboriculture (4)

Care and management of large ornamental trees. Use of ropes and other safety equipment in tree climbing. Cavity work, bracing, cabling, and pruning. 3 lectures, 1 laboratory. Prerequisite: OH 123, OH 231, OH 232, or consent of instructor.

OH 422 Advanced Arboriculture (2)

Theory and practices utilized in the management of ornamental trees found in landscaped urban settings. Scheduling of cultural practices and safe usage of hand and power equipment, as specified by professional arborists, and other safety regulations. 1 lecture, 1 laboratory. Prerequisite: OH 421 and consent of instructor.

OH 424 Nursery Crop Production (4)

History and overview of the nursery industry. Types of wholesale nurseries and their products. Plant production systems, scheduling, marketing. Emphasis on the wholesale nursery industry in the western U.S. Field trip required. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: OH 124, OH 221, OH 222, SS 221, senior standing, or consent of instructor.

OH 425 Tissue Culture Propagation (3)

Principles of tissue culture applied to the propagation of ornamental plants. Systems applicable to commercial crops, laboratory organization, media, and current research. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: OH 124 and BOT 322 or CRSC 410.

OH 427 Disease and Pest Control Systems for Ornamental Plants (4)

Recognition, prevention and control of diseases and insect/mite pests that impact commercial ornamental plantings. Integrated pest management strategies presented including biological, cultural, and safe and proper pesticidal controls. Laboratory emphasizes hands-on approach to disease and pest control procedures. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: OH 121, CRSC 311, BOT 324 and senior standing.

OH 428 Plant Growth Regulators and Weed Control for Ornamental Plants (4)

Plant growth regulation and weed control materials and methods used in environmental horticulture production and landscape systems. Methods and materials, including selection, calculation, calibration, application and evaluation of results. 3 lectures, 1 laboratory. Prerequisite: Senior standing and OH 121, OH 122, OH 123, OH 124, OH 221, OH 222, OH 231, OH 232 or consent of instructor.

OH 434 Landscape Management (3)

Maintenance procedures and operations. Estimating scheduling, recordkeeping and implementation of landscape maintenance projects. Interior landscape maintenance. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory. Prerequisite: OH 123, OH 126, or permission of instructor.

OH 435 Interiorscaping (4)

Systematic presentation and critique of current aspects of interior landscaping. Elements of design, environmental influences and measurements, plant materials selection, specifications, procurement and installation, and subsequent maintenance of finished interiorscape. 3 lectures, 1 laboratory. Prerequisite: OH 301 and OH 324 or consent of instructor.

OH 443 Greenhouse Management (4)

Problems and practices in the management of greenhouses. Scheduling greenhouse crops, planning crop rotation, cost accounting for floricultural crops, management decisions in production costs and personnel matters. Field trips required. 3 lectures, 1 laboratory. Prerequisite: OH 342 or consent of instructor.

OH 461 Senior Project (2)

Selection of a project under faculty adviser approval. Initial research and data gathering period for project information. Projects typical of problems which graduates must solve in their fields of study or employment. Project results are presented in a formal written report completed in OH 462. Contract drawn up with approval of adviser. Minimum 60 hours. Prerequisite: All 100–200 level courses in OH curriculum; 135 units; ENGL 114, ENGL 215 or ENGL 218.

OH 462 Senior Project (2)

Continuation of Senior Project development. Write-up of rough draft and formal draft of project. Completion of formal written report under adviser supervision. Minimum 60 hours. Prerequisite: Completion of OH 461 with a grade of C or better.

OH 463 Senior Seminar (1)

Open forum for senior students presenting information and developing skills necessary for career planning in professional horticulture. Exposure to current employment trends in the OH industry. 1 seminar. Prerequisite: OH 461.

OH 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

OH 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 laboratories. Prerequisite: Consent of instructor.

OH 581 Graduate Seminar in Ornamental Horticulture (3)

Group study of current problems of the ornamental horticulture industry; current experimental and research findings as applied to production and to the teaching of horticulture. Service course for, and topics chosen by, Agriculture Education Department. Not available for credit for OH majors. Repeatable for credit up to 9 units. 3 seminars.

PE—PHYSICAL EDUCATION

Number Fields for Physical Education Courses

	Coed (PE)	Men (PEM)	Women (PEW)
Basic Instructional Program	100-165		
Intramural activities	174		
Competitive athletics	181-199	181-199	181-199
Professional activities (PE majors or related concentration students only)	206-229		
Academic courses	240 up		

BASIC INSTRUCTIONAL PROGRAM

Enrollment is open to all students except for designated intramural courses. Courses carry 1 unit of credit, meet 2 hours per week, and are designed to develop skill, knowledge of rules, background and analysis of techniques, and desirable attitudes toward physical fitness and participation in physical activities.

The beginning course or its equivalent is prerequisite to the intermediate, and the intermediate to the advanced. Prerequisite may be waived by consent of the instructor.

No more than two different activity courses nor more than one section of an individual activity course may be taken for credit in any one quarter. A student may not enroll simultaneously in the same quarter for a beginning, intermediate and/or advanced activity course. Any level of an activity course can be repeated only once for credit.

Students not majoring in physical education may apply a maximum of 12 units of credit earned in general and intramural activity courses toward the bachelor's degree.

All basic instructional courses (PE 100–176) are evaluated on a Credit/No Credit basis. A miscellaneous course fee may be required—see *Class Schedule*.

Coed

PE 100 Adaptive Activity
PE 101 Gymnastics
PE 102 Tumbling and Vaulting
PE 103 Archery
PE 104 Badminton, Beg.
PE 105 Badminton, Int.—Adv.
PE 108 Basketball
PE 109 Bowling
PE 110 Cycling
PE 111 Fencing
PE 116 Aerobic Exercise
PE 121 Golf, Beg.
PE 122 Golf, Int.—Adv.
PE 125 Jogging
PE 126 Judo
PE 129 Stretch, Flex and Relax
PE 131 Physical Conditioning
PE 132 Racquetball, Beg.
PE 133 Racquetball, Int.—Adv.
PE 135 Skin Diving
PE 136 Scuba Diving

PE 137 Self-Defense
PE 138 Karate
PE 139 Soccer
PE 140 Ultimate Disc
PE 142 Softball
PE 143 Swimming for Non-Swimmers
PE 144 Swimming, Advanced Beginner
PE 145 Swimming, Int.
PE 146 Swimming, Adv.
PE 147 Swim Conditioning
PE 148 Tennis, Beg.
PE 149 Tennis, Int.—Adv.
PE 151 Volleyball, Beg.
PE 152 Volleyball, Int.—Adv.
PE 154 Weight Training
PE 156 Aqua-Aerobics
PE 159 Wrestling
PE 174 Intramurals
PE 176 Fitness Walking

COMPETITIVE ATHLETICS

Enrollment limited to those academically qualified to compete in intercollegiate athletic programs. Consent of coach required. Total credit limited to 8 units. Courses are each 2 units and meet for a minimum of 10 hours per week. All competitive athletics courses are evaluated on a Credit/No Credit basis.

Men

PEM 182 Baseball
PEM 183 Basketball
PEM 184 Cross Country
PEM 185 Football
PEM 189 Soccer
PEM 191 Swimming
PEM 192 Tennis
PEM 193 Track and Field
PEM 196 Wrestling

Women

PEW 183 Basketball
PEW 184 Cross Country
PEW 190 Softball
PEW 191 Swimming
PEW 192 Tennis
PEW 193 Track and Field
PEW 194 Volleyball

PROFESSIONAL ACTIVITIES

Priority for enrollment given to those students pursuing a major in Physical Education. Physical Education majors may apply a maximum of 24 units of credit earned in PE 101-239 toward the bachelor's degree. When applicable, course selection should be determined by the student after consultation with his/her adviser. All courses are one or two units and meet for two or four hours per week. All professional activities are designed to attain intermediate skills in performance and analysis and knowledge of rules and strategy. Prerequisites in the PE 101-165 series activities will be required for those students who cannot demonstrate minimum skill levels.

PE 206 Gymnastics (2)
PE 208 Golf (1)

- PE 209 Creative and Non-Traditional Games (1)
 PE 210 Tennis (1)
 PE 211 Softball-Baseball (1)
 PE 212 Handball/Racquetball (1)
 PE 213 Basketball (1)
 PE 214 Volleyball (1)
 PE 215 Field Sports (Soccer, Speedball, Speed-a-Way) (2)
 PE 216 Wrestling (1)
 PE 217 Flag Football/Football (1)
 PE 218 Aquatics (2)
 PE 219 Progressive Strength Training (1)
 PE 221 Combatives/Self Defense (1)
 PE 222 Archery (1)
 PE 223 Cross Country and Track Events (1)
 PE 224 Field Events (1)
 PE 225 Team Handball (1)
 PE 227 Aerobic Dance Exercise (2)
 PE 229 Badminton (1)

ACADEMIC COURSES

Professional courses designed primarily for the student majoring in physical education. PE 250 may be used in partial satisfaction of the General Education-Breadth requirement in physical education.

PE 241 Understanding Fitness and Training (1)

Introduction to physiological principles and factors which provide the basis for the development and maintenance of optional physical fitness. 1 lecture. Prerequisite: Concurrent enrollment in PE 110, PE 116, PE 125, PE 131, PE 145, PE 146, PE 147, PE 154 or PE 156.

PE 242 Pre-WSI (1) (CR/NC)

Designed to offer certification in American Red Cross Emergency Water Safety (EWS) and Instructor Candidate Training (ICT). Teaching methods as related to American Red Cross courses; cognitive and skill acquisition relating to emergency water rescue methods. Credit/No Credit grading only. 1 activity. Prerequisite: PE 145 or equivalent.

PE 243 Lifeguard Training (3)

Lifeguarding theory, knowledge, techniques and skills. Students completing course will be eligible for American Red Cross Lifeguard Training Certification exam. 1 lecture, 2 activities. Prerequisite: Successful completion of Red Cross swimming skills test, consent of instructor.

PE 250 Health Education (2)

GEB E.2.

Introductory health course geared to bridge the gap between scientific health discoveries and one's application of these discoveries in the daily living pattern. 1 lecture, 1 recitation.

PE 252 Introduction to Athletic Training (2)

Modern principles and practices in the prevention, treatment, rehabilitation and follow-up care of athletic injuries. Functions and limitations of the athletic trainer as an athletic paramedic. Theory and practice of adhesive strapping as related to supporting major body joints for athletic participation. 2 activities. Prerequisite: GEB B.1.b.

PE 270 Orientation to Physical Education (2)

Designed to acquaint the student with the concept of physical education as a profession and to orient the student

to the Cal Poly program. 2 lectures. Prerequisite for non-majors: Consent of instructor.

PE 275 Sports Officiating (2)

Designed to provide knowledge, understanding, appreciation of officiating in general, and the development of skills in officiating. 1 lecture, 1 activity.

PE 276 Athletic Coaching Theory (3)

Basic concepts, methods, practices, strategies and philosophies as they apply to competitive athletics. 3 lectures.

PE 277 Coaching Practicum (2)

Practical experience through the actual coaching of a competitive sports team. 2 activities; minimum of 2 hours per week per unit. Total credit limited to 6 units. Prerequisite: PE 276 and consent of adviser.

PE 280 First Aid and CPR (3)

Standard American Red Cross first aid and CPR course. Instruction and practice in the immediate and temporary care of injuries and sudden illness. 2 lectures, 1 activity.

PE 296 Planning Techniques in Physical Education (3)

Practical skills and techniques of teaching physical education in schools. Unit and lesson planning, class management, teaching aids. Implementation and evaluation of lessons in a laboratory setting. 2 lectures, 1 activity. Prerequisite: 4 units of professional physical education activity courses (PE 206–229).

PE 302 Mechanical Kinesiology (4)

Fundamental biomechanical concepts and their application to human movement activities, and analyses of exercise mechanics and skill performance. 3 lectures, 1 laboratory. Prerequisite: ZOO 237 and ZOO 340.

PE 303 Physiology of Exercise (4)

Application of the knowledge of human physiology to exercise situations. 3 lectures, 1 laboratory. Prerequisite: ZOO 238 and ZOO 239. Recommended: FSN 210.

PE 305 Drug Education (2)

Instruction on the nature and effect of the use of tobacco, alcohol, narcotics and restricted dangerous drugs. 2 lectures. Prerequisite: PE 250.

PE 307 Adaptive Physical Education (4)

Major categories of handicapping conditions with implications for the development of physical activity programs for specific disabilities. 3 lectures, 1 laboratory. Prerequisite: ZOO 237, ZOO 238 and ZOO 239.

PE 310 Concepts in Elementary Physical Education (3)

Historical, physiological, mechanical, psychological, and sociological foundations of physical education. Movement as it relates to physical fitness, wellness, social development, cross-cultural understanding, and self-image. 2 lectures, 1 activity. Prerequisite: GEB E.2. (See page 77 for GEB requirements.)

PE 318 Measurement and Evaluation in Physical Education I (3)

Scientific basis of evaluating programs in physical education. Experimental, survey, and historical evaluative methods.

Statistical design and analysis with packaged computer programs and data base management. 3 lectures.
Prerequisite: STAT 217 and GEB F.1. (See page 77 for GEB requirements.)

PE 319 Measurement and Evaluation in Physical Education II (4)

Principles of test selection and administration, measurement and evaluation of characteristics and data, library research, data analysis, experimental design, questionnaire construction and sampling techniques related to physical education. 3 lectures, 1 activity. Prerequisite: PE 318.

PE 350 Computer Applications in Teaching Physical Education (3)

Practical experience with educational applications of microcomputers and software designed to aid the physical education teacher. 1 lecture, 2 activities. Prerequisite: CSC 113, or PE 318, or consent of instructor.

PE 354 School Health Programs (2)

Introduction to school health services, environment, and instruction within the public and private school system. Health instruction and curriculum. Identification and control of children's communicable diseases and special problems within the classroom. 2 lectures. Prerequisite: PE 250.

PE 356 Teaching Gymnastics (2)

Techniques and problems in teaching gymnastics along with practical experience. Emphasis on teaching progressions, class organization, spotting, and safety. 2 activities. Prerequisite: PE 206, PE 296, or consent of instructor.

PE 384 Water Safety Instructor (3)

Analyzing swimming strokes and techniques with emphasis on teaching methods for beginning, intermediate, and advanced skills. Teaching infant and pre-school children. Teaching basic water safety and emergency water safety skills. Curriculum requirements can be satisfied without WSI card requirements. 1 lecture, 2 activities. Prerequisite: Pass swimming skills test.

PE 385 Lifeguard Instructor (2)

Analyzing lifeguard skills with emphasis on techniques and methods for teaching advanced aquatic rescue skills. Upon successful completion of this course, American Red Cross Lifeguard Instructor certification will be issued. 1 lecture, 1 activity. Prerequisite: PE 242 and PE 243 or equivalent certifications.

PE 400 Special Problems for Advanced Undergraduates (1-3)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 3 units per quarter. Prerequisite: Senior standing or consent of instructor.

PE 401 Administration of Physical Education and Health/Fitness Programs (3)

Underlying philosophy, principles, policies, and procedures of administration and management as applied to physical education and health/fitness in various settings such as schools and commercial and corporation fitness enterprises.

3 lectures. Prerequisite: Junior standing (preference given to PE majors).

PE 402 Motor Learning and Control (4)

Variables which control sensory-motor integration. Analysis of factors which affect the acquisition of motor skills as related to the learning process and the learning environment. 3 lectures, 1 activity. Prerequisite: GEB F.1. and PE 318 or PE 319, or consent of instructor.

PE 404 Motor Development (3)

Motor development of individuals from birth to maturity. Emphasis on interrelationship between motor and cognitive characteristics and affective needs and interests. 3 lectures. Prerequisite: Two physical education Basic Instructional Program courses (PE 101-165) and senior standing.

PE 405 Administration of Health Education (2)

Current procedures and policies in the development and basic administration of public and school health education programs. 2 lectures. Prerequisite: PE 354.

PE 408 Exercise and Health Promotion for Senior Adults (3)

Special fitness, exercise, and health needs of the senior population. Theories of aging and age-related changes. Health promotion, exercise needs and activity programs for senior adults. 3 lectures. Prerequisite: PE 250, senior standing or consent of instructor.

PE 410 Psychology of Coaching (3)

Psychological considerations of the coach-athlete relationship and mental preparation of teams and individuals for competition and practice. Special emphasis on the male and female adolescent with regard to the psychological implications of sports participation. 3 lectures. Prerequisite: PSY 201 or PSY 202.

PE 411 The Human Element in Sport (3)

Principles of sport psychology and sport sociology. The effect of sport on individuals and groups in American society. 3 lectures. Prerequisite: GEB D.4.a. and PSY 201 or PSY 202.

PE 412 Contemporary Issues in Sport (3)

Selected topics dealing with sports as a social phenomenon in American life. *Class Schedule* will list topic selected. Total credit limited to 6 units. 3 lectures.

PE 416 Physical Education/Recreation Facilities (3)

Management, clientele considerations, facilities and outdoor areas planning and operations, personnel, finance and equipment as related to physical education and recreation areas and facilities. Consideration of architectural and environmental barriers. Field visits required. Miscellaneous course fee required—see *Class Schedule*. 3 lectures. Prerequisite: Upper division standing and consent of instructor for non-PE/REC majors.

PE 419 Curriculum and Program Content in Elementary Physical Education (3)

Cognitive and psychomotor competencies required to design a developmental physical education program for elementary aged school children. 2 lectures, 1 activity. Prerequisite: PE 296. Recommended: PSY 210/202, PE 206.

PE 420 Administration of Aquatic Programs (3)

Preparation for national certification as a pool operator. Health and sanitation in swimming facilities; state swimming codes; pool chemistry; filtration systems; safety; liability; instructional programming; facility design; and equipment. 3 lectures. Prerequisite: PE 384 or consent of instructor.

PE 421 Strategies for Teaching Physical Education (3)

Systematic analysis and refinement of teaching skills within the discipline of physical education. 2 lectures, 1 activity. Prerequisite: PE 296, PE 419, and 2 activity classes.

PE 422 Teaching Elementary Physical Education (2)

Implementation of a developmental physical education program for elementary aged children. The program will complement that conducted in the local public schools. 1 lecture, 1 activity. Prerequisite: PE 296, PE 419, and PE 421.

PE 423 Teaching Secondary Physical Education (3)

Techniques for teaching physical education in junior high school. Emphasis on class organization, lesson plan development and evaluation, class management and control, and understanding the junior high school setting. 3 activities. Prerequisite: PE 206, PE 296 and PE 421.

PE 424 Organization and Implementation of a K-12 Physical Education Program (3)

Organization, selection, presentation, strategy, application, and interpretation of K-12 subject matter in physical education. 3 seminars. Prerequisite: PE 296, PE 419, PE 422 and PE 423.

PE 432 Athletic Training and Rehabilitation (2)

Modern principles and practices in conditioning and care of athletes. Theory and practice in the scientific manipulation of the muscles as related to therapeutic exercise. 2 activities. Prerequisite: PE 241 and PE 252 for non-PE majors; PE 252 and senior standing for PE majors.

PE 434 Design and Implementation of Health and Fitness Programs (3)

Application of training physiology to development of health and fitness programs. Role of exercise in health promotion. Evaluation of current practice in health and fitness program design and implementation in various commercial and corporate settings. Review of knowledge and skills of health and fitness professionals. 3 lectures. Prerequisite: PE 252, PE 302, PE 303.

PE 437 Directed Fieldwork (1-3) (CR/NC)

Practical work experience in related phases of physical education under qualified supervision. Total credit limited to 9 units. Credit/No Credit grading only. Minimum of 2 laboratory hours per week per unit. Prerequisite: Senior standing or consent of adviser.

PE 438 Adaptive Physical Education Fieldwork (1-3) (CR/NC)

Practical experience in physical education for special populations. Students plan and conduct physical activity programs for subjects who have special needs. Total credit limited to 6 units. Credit/No Credit grading only. Prerequisite: PE 307, consent of instructor.

PE 439 Commercial/Corporate Fitness Internship (3)

Practical experience at approved site which provides fitness and wellness programs. Students participate in program administration under direct supervision of on-site coordinator. Prerequisite: Senior standing and successful completion of all undergraduate requirements except PE 439.

PE 440 Physical Education Practicum (1)

Supervised experience involving organizational and instructional responsibilities in activity, lecture and/or laboratory classes as determined by curricular concentration or certificate program. Total credit limited to 3 units. Prerequisite: PE 423 or consent of instructor.

PE 445 Electrocardiography (3)

Basic principles of electrocardiography, including practical skills of the ECG technician. Recognition of normal ECG patterns and abnormal changes related to rhythm disturbances, conduction defects, and myocardial ischemia/infarction. 2 lectures, 1 laboratory. Prerequisite: CHEM 328, PE 303, ZOO 237, ZOO 238, ZOO 239, or consent of instructor.

PE 450 Lifestyle Management (3)

Designed to acquaint students with those events, situations and relationships leading to healthy lifestyles in fitness and occupational settings. Emphasis on stress and time management, exercise, nutrition and relaxation techniques. Design and implementation of workplace health promotion programs. 3 lectures. Prerequisite: Senior standing. Non-majors: Consent of instructor.

PE 451 Nutrition for Fitness and Sport (3)

Application of nutritional facts to selected aspects of physical training, degenerative disease, obesity and weight control, diet manipulation and modification in sport, nutrition supplementation and special dietary considerations for the young and old, male and female athletes. 3 lectures. Prerequisite: HE 210/FSN 210 and PE 303.

PE 452 Testing and Exercise Prescription for Fitness Specialists (3)

Selected areas of health/fitness screening and evaluation. Application of components relevant to the development and administration of exercise programs for persons regardless of sex, age, functional capacity and presence or absence of CHD or CHD risk factors. 1 seminar, 2 laboratories. Prerequisite: HE 210/FSN 210, PE 303, PE 445 or consent of instructor.

PE 461 Senior Project (2)

Senior project topic selection and development. Research methodology leading to design of the project. Project background, delimitation, literature search, and data collection techniques. 2 lectures. Prerequisite: PE 302, PE 303, PE 319, PE 402 and junior level writing course.

PE 462 Senior Project (1-3)

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. The number of units is based upon the complexity of the project as determined by the

adviser. Minimum 30 hours total time per unit of credit. Prerequisite: PE 461 and consent of adviser.

PE 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 lectures. Prerequisite: Consent of instructor.

PE 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 laboratories. Prerequisite: Consent of instructor.

PE 474 History and Philosophy of Physical Education (3)

History of physical education including philosophical, institutional, and personal influences. Application of education principles to physical education. 3 lectures. Prerequisite: PE 270.

PE 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

PE 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

PE 500 Individual Study (1–3)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Only 6 units may be applied to degree requirements. Prerequisite: PE 517 and consent of department head, graduate adviser, and supervising faculty member.

PE 502 Current Trends and Issues in Physical Education (3)

Practical problems in physical education and their solution in terms of desired objectives in this field. 3 seminars. Prerequisite: Graduate standing.

PE 503 Seminar in Adult Wellness (3)

Advanced seminar investigating topics relating to wellness in adults. Cardiovascular, respiratory, and stress related diseases as well as health issues in the later years. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

PE 504 Cardiopulmonary Physiology, Pathology, and Exercise (3)

Selected cardiovascular and pulmonary disease problems, their etiology, symptoms, diagnosis, physical limitations, and physiology as affected by exercise in therapy and

rehabilitation. 3 seminars. Prerequisite: ZOO 331, ZOO 332, PE 303.

PE 511 Administration of Physical Education and Athletics (3)

Principles and techniques of administration of physical education and athletics on the elementary and secondary school levels. 3 seminars. Prerequisite: Graduate standing.

PE 514 Health Education Planning (3)

Resolution of health problems in the workplace and community requires constant involvement in the systematic process of planning. Included in this course is the investigation of planning forces and processes that move toward specification of actions to address health problems. 3 seminars. Prerequisite: PE 250 and PE 401 or consent of instructor.

PE 515 Communication and Behavior Within a Health and Physical Education Setting (3)

Communication and behavioral theories integrated into activities or programs for the purpose of changing, encouraging, and maintaining healthful behavior. 3 seminars. Prerequisite: PE 250, PE 401 or consent of instructor.

PE 516 Management of Health Promotion in the Workplace (3)

Application and development of principles, procedures and concepts for managing and facilitating promotion in various health and fitness settings. 3 seminars. Prerequisite: PE 401 and PE 450.

PE 517 Research Methods in Physical Education (3)

Experimental, descriptive, historical, philosophical, and action research in physical education. Selection of adequate problems for investigation; various sampling techniques and analyses; use of library facilities; manuscript requirements for the thesis. 3 seminars. Prerequisite: PE 319 or consent of instructor.

PE 519 Evaluation of Current Studies (3)

Analysis and evaluation of published studies in physical education, health education and recreation. 3 seminars. Prerequisite: PE 517.

PE 522 Biomechanics (3)

Advanced biomechanical concepts applied to human movement, examination of research, and biomechanical analyses of movement activities. 2 seminars, 1 laboratory. Prerequisite: PE 302 or equivalent.

PE 525 Human Performance and Learning (3)

Analysis of research principles and concepts and variables related to human motor performance and learning with emphasis on the information processing approach for evaluating performance. 3 seminars. Prerequisite: Graduate standing.

PE 526 Sport in American Society (3)

Understanding the role of sport in American society as viewed from sociological and psychological perspectives. Effect of success and failure in competitive sport situations. 3 seminars. Prerequisite: Graduate standing.

PE 530 Advanced Physiology of Exercise (4)

Physiological determinants of physical work capacity and sports performance. 3 seminars, 1 laboratory. Prerequisite: PE 303.

PE 536 Advanced Electrocardiography (4)

Theory and application of electrocardiography and other techniques for cardiovascular assessment and treatment of cardiac disease and other abnormalities. 3 seminars, 1 laboratory. Prerequisite: PE 445 or equivalent.

PE 537 Internship (3–12) (CR/NC)

Supervised work experience in an approved wellness/fitness clinical facility, school, or other faculty approved setting. Total credit limited to 12 units. Maximum of 6 units may be applied toward Master of Science in Physical Education. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor. Student must be advanced to candidacy.

PE 539 Development, Observation and Analysis of Teaching Physical Education (3)

Development of effective teaching strategies and observation and analysis of teaching with special emphasis in sport pedagogy systems. 2 seminars, 1 activity. Prerequisite: Undergraduate methods and/or instructional process class.

PE 581 Graduate Seminar in Physical Education (1–3)

Directed group study of selected topics for advanced students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 seminars. Prerequisite: Graduate standing or consent of instructor.

PE 585 Cooperative Education Experience (6) (CR/NC)

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

PE 599 Thesis or Project (3) (3)

Completion of a thesis or project pertinent to the field of physical education. Independent research under the guidance of the faculty. Prerequisite: PE 519, consent of graduate committee and supervising faculty member.

PHIL—PHILOSOPHY**PHIL 125 Critical Thinking (3) (Also listed as ENGL 125 and SPC 125) GEB A.2.**

Nature of critical thinking. Analysis of inductive and deductive arguments. Practice in the criticism and composing of arguments in English. 3 lectures. Prerequisite: ENGL 114.

PHIL 170 Problems of Philosophy (3)

Main problems and basic concepts of philosophy. Methods of philosophical analysis and argumentation. Oral and written expression of philosophical ideas using a case mode presentation. 3 lectures. Prerequisite: PHIL 125 or ENGL 125 or SPC 125.

PHIL 225 Symbolic Logic (3)

Methods of proof in propositional and predicate logic including conditional and indirect proof procedures. 3 lectures. Prerequisite: ENGL 125 or PHIL 125 or SPC 125.

PHIL 230 Philosophical Classics (3) GEB C.1.

Readings of various philosophic classics with focus on the identification and evaluation of the central metaphysical and epistemological themes. Various major arguments through a case mode presentation. 3 lectures. Prerequisite: ENGL 125 or PHIL 125 or SPC 125.

PHIL 231 Philosophical Classics (3) GEB C.1.

Readings with focus on the identification and evaluation of the central themes of ethics, social and political philosophy. Various major arguments through a case mode presentation. 3 lectures. Prerequisite: ENGL 125 or PHIL 125 or SPC 125.

PHIL 311 Greek Philosophy (3) GEB C.3.

Beginnings of Western philosophy and science. Presocratics, Socrates, Plato, and Aristotle. Greek philosophies in the Roman world. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 312 Medieval Philosophy (3) GEB C.3.

Development of Western philosophy from Augustine to Ockham, including the philosophies of Anselm, Abelard, Roger Bacon, Bonaventure, Aquinas and Duns Scotus. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 313 Continental Philosophy: Montaigne to Leibnitz (3) GEB C.3.

Development of Western philosophy from the Renaissance through Leibnitz with special emphasis upon the philosophies of the Continental Rationalists. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 314 British Philosophy: Bacon to Mill (3) GEB C.3.

Development of Western philosophy from the Renaissance through Mill with special emphasis upon the philosophies of the British Empiricists. Prerequisite: PHIL 230 or PHIL 231.

PHIL 315 German Philosophy: Kant to Nietzsche (3) GEB C.3.

Primary issues and concepts found in German philosophy from 1780 to 1900, with emphasis on Kant, Hegel, and Nietzsche. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 316 Contemporary European Philosophy (3) GEB C.3.

Recent movements within the Continental tradition, including French and German existentialism, phenomenology, and post-metaphysical philosophy. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 317 Contemporary British and American Philosophy (3) GEB C.3.

Distinctly Anglo-American philosophical movements of the twentieth century including pragmatism, realism, relativism, positivism, and various schools of analytic philosophy. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 321 Philosophy of Science (3) GEB C.3.

Methods of physics, biology, psychology and other selected sciences, with reference to their presuppositions and general

findings. Relations between the sciences and implications of scientific methods for other fields of inquiry. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 322 Philosophy of Cognitive Science (3)

Systematic study of the problems and issues of the self and consciousness, of mental states and events and of human action; and of the relation of the philosophy of mind to such areas as psychology, linguistics and computer science. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 327 Inductive Reasoning (3)

Introduction to inductive reasoning. The traditional problem of induction. Mill's methods for discovering causes. Induction and the concept of probability. 3 lectures. Prerequisite: PHIL 125 or ENGL 125 or SPC 125.

PHIL 331 Ethics (3) GEB C.3.

Inquiry into the problems of the principles of right action and justice, of moral character and motivation, and of the good life. Examination of traditional and contemporary answers to these problems and the implications of those answers. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 332 History of Ethics (3) GEB C.3.

History of ethics from the Greeks to the 20th Century. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 333 Political Philosophy (3) GEB C.3.

Philosophic foundations of political ideologies. Freedom, state, law, obligation, sanction, and their relation to metaphysics, theory of knowledge, and ethics. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 334 Jurisprudence (3) (Also listed as POLS 334) GEB C.3.

Normative and analytic questions about law. Nature of law and legal systems. Justification of law. Moral obligation to obey the law. Nature and justification of punishment. Guilt and legal responsibility. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 335 Social Ethics (3) GEB C.3.

Critical examination of ethical problems connected to issues of social justice for ethnic minorities in contemporary American society. These issues include racial and sexual discrimination, racial and sexual harassment, preferential hiring, and the relation of capital punishment to ethnicity. Related individual rights and public policy issues will also be examined. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 337 Professional Ethics (3) GEB C.3.

Critical examination of ethical problems arising in the professions. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 339 Biomedical Ethics (3) GEB C.3.

Critical examination of ethical problems arising in biology, biotechnology and medicine. Concepts of health and disease, ethical issues of human experimentation, informed consent, behavior control, genetic intervention, new birth technologies. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 340 Environmental Ethics (3) GEB C.3.

Ethical analysis of various positions on the status of non-human entities and the most reasonable approaches to environmental problems such as pollution, species

preservation, global warming and others. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 342 Philosophy of Religion (3) GEB C.3.

Inquiry into the nature of religious experience and claims, naturalism and supernaturalism, arguments for the existence of God, the problem of evil, miracles, revelation, faith, human nature and destiny, verification and refutation of religious claims. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 351 Traditional Theories of Aesthetics (3) GEB C.3.

Critical examination of philosophical views of art from Plato through Kant to Collingwood and Dewey. Special emphasis given to the relationship among art, truth and reality, and to the nature of aesthetic experience. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 352 Contemporary Problems in Aesthetics (3) GEB C.3.

Critical examination of philosophical issues related to art, with emphasis on problems affecting aesthetics with the rise of modern art. Topics covered include the problem of defining art, the problem of determining standards for interpreting art, and the relation of aesthetic values to moral, social and political values. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

PHIL 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

PHIL 411 Metaphysics (3) GEB C.3.

Traditional and current ideas and arguments about substance, the relation of universals to particulars, space and time, events, causation and necessity, the self and free will. 3 lectures. Prerequisite: PHIL 230.

PHIL 412 Epistemology (3)

Traditional and current ideas and arguments about the possibility of knowledge, the limits and powers of perception, reason and memory as ways of knowing, and the nature of necessary and contingent truth. 3 lectures. Prerequisite: PHIL 230.

PHIL 460, 461 Senior Project (3) (3)

Selection and completion of a thesis under faculty supervision. Minimum of 180 hours total time. Prerequisite: Prior consent of instructor.

PHIL 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. *Class Schedule* will list topics selected. Total credit limited to 6 units. 1-3 lectures. Prerequisite: Consent of instructor.

PHYS-PHYSICS

PHYS 104 Introductory Physics (4) GEB B.1.a.

Fundamental principles of mechanics, heat, light and electricity. Not to be taken by students who have taken a

college course in physics. 4 lectures. Prerequisite: MATH 103, MATH 117, MATH 118 or MATH 120.

PHYS 121 College Physics (4) GEB B.1.a.

An introductory course in mechanics emphasizing motion, force, and energy. Not open for credit to students having a grade of C- or better in PHYS 131. 3 lectures, 1 laboratory. Prerequisite: MATH 117 and high school trigonometry or, MATH 119, or MATH 120.

PHYS 122 College Physics (4) GEB B.1.a.

Continuation of PHYS 121. Topics include properties of materials, fluids, waves and vibrations, sound, heat, light and optics. Not open for credit to students having a grade of C- or better in PHYS 132. 3 lectures, 1 laboratory. Prerequisite: PHYS 121.

PHYS 123 College Physics (4) GEB B.1.a.

Continuation of PHYS 121 and 122. Electrostatics, electric current, magnetic fields and induction. Elements of modern physics. Not open for credit to students having a grade of C- or better in PHYS 133. 3 lectures, 1 laboratory. Prerequisite: PHYS 121. Recommended: PHYS 122.

PHYS 131 General Physics (4) GEB B.1.a.

Fundamental principles of mechanics. Vectors, particle kinematics, statics and dynamics. Equilibrium of a rigid body. Work and energy, linear momentum, rotational kinematics and dynamics. Primarily for engineering and architecture students, and for students majoring in the physical sciences. 3 lectures, 1 laboratory. Prerequisite: MATH 131 or concurrent enrollment in MATH 142. High school physics recommended.

PHYS 132 General Physics (4) GEB B.1.a.

Oscillations, waves in elastic media, sound waves. Temperature, heat and the first law of thermodynamics. Kinetic theory of matter, second law of thermodynamics. Geometrical and physical optics. 3 lectures, 1 laboratory. Prerequisite: PHYS 131.

PHYS 133 General Physics (4) GEB B.1.a.

Charge and matter, electric field, electric potential, dielectrics, capacitance, current and resistance, electromotive force and circuits, magnetic fields, magnetic field of a moving charge, induced emf. 3 lectures, 1 laboratory. Prerequisite: PHYS 131, MATH 132 or MATH 142.

PHYS 137 General Physics: Applied Physics for Architects (4)

Applied physics problems related to architecture. Damped, forced, and coupled oscillations in mechanical structures and electric circuits. Earthquakes and structures. Elementary electric circuit and wiring concepts. Energy transport, and efficient use of energy and passive solar energy in buildings. For School of Architecture and Environmental Design majors. 3 lectures, 1 laboratory. Prerequisite: PHYS 132, MATH 142.

PHYS 200 Special Problems for Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

PHYS 201 Learning Center Tutor (1) (CR/NC)

Act as a tutor in the Physics Learning Center. Help students with problem solving techniques and introductory physics course material. Total credit limited to 3 units, with a maximum of 1 unit per quarter. Credit/No Credit grading only. Prerequisite: PHYS 133 and consent of instructor.

PHYS 202 Physics and the Computer (3)

Introduction to microcomputer tools for physics. Graphics, plotting, use of spreadsheets, integration, differential equations, simulations, statistical techniques, non-linear equations. Applications to problems in physics. 3 lectures. Prerequisite: PHYS 133, GEB F.1. elective, and concurrent enrollment in MATH 242.

PHYS 206 Instrumentation in Experimental Physics (3)

L-R-C circuits and electronic circuit elements emphasizing the applications of analog and digital electronics to instrumentation in modern physics. 3 lectures. Prerequisite: PHYS 133, MATH 143, GEB F.1. elective, and concurrent enrollment in PHYS 256.

PHYS 211 Modern Physics I (4) GEB B.1.a.

Special relativity, fundamental principles of quantum mechanics, emphasizing the modern description of atomic phenomena. Kinetic theory, wave particle duality, Bohr theory, Schrodinger equation, elementary atomic structure. 4 lectures. Prerequisite: PHYS 123 or PHYS 133, and MATH 133 or MATH 241.

PHYS 212 Modern Physics II (3) GEB B.1.a.

Applications of quantum physics to atoms, nuclei, and elementary particles. Nuclear reactions, radioactivity, nuclear energy. 3 lectures. Prerequisite: PHYS 211.

PHYS 215 Physics of Sound and Music (3) GEB B.1.a.

Wave nature of sound. Musical instruments and production of sound, overtones and tone quality, musical scales, decibels and noise hazards. Speech and hearing. Recording and reproduction of sound. Electronic instruments and synthesizers. Room acoustics. 3 lectures. Prerequisite: PHYS 104 or PHYS 122 or PHYS 132 or PSC 101 or consent of instructor.

PHYS 243 Introductory Modern Physics Laboratory (1) GEB B.1.a.

Experiments in modern physics, including atoms and techniques of nuclear radiation detection. Properties of alpha, beta and gamma radiation. 1 laboratory. Prerequisite or concurrent: PHYS 212, PHYS 256 or equivalent.

PHYS 256 Electrical Measurements Laboratory (1)

Experimental studies of circuit analysis and electronics; introduction to digital techniques; instrumentation. 1 laboratory. Prerequisite: PHYS 133, MATH 143, and concurrent PHYS 206.

PHYS 301 Thermal Physics I (3) GEB B.1.a.

Thermodynamics and statistical mechanics. Entropy, temperature, chemical potential, free energy. Selected applications including paramagnetism, ideal gas, Fermi-Dirac distribution. 3 lectures. Prerequisite: PHYS 132, PHYS 211, MATH 241.

PHYS 302 Analytical Mechanics I (3) GEB B.1.a.

Vector analysis, laws of motion, kinematics and dynamics of a particle. Work and energy. Oscillatory motion (damped and forced oscillation). Center of mass. Linear and angular momentum. 3 lectures. Prerequisite: PHYS 131, MATH 242.

PHYS 303 Analytical Mechanics II (3) GEB B.1.a.

Dynamics of a rigid body. Three-dimensional motion of a rigid body. Introduction to Lagrange's and Hamilton's equations. 3 lectures. Prerequisite: PHYS 302. Concurrent: MATH 304.

PHYS 310 Physics of Energy (3) GEB B.1.a.

Physics and mathematics applied to broad energy topics. Efficient usage, transportation, solar energy, nuclear fission and fusion. Plasma, hydrogen economy, fuel cells, wind wave, tidal, and geothermal energy. Transmission, storage, fossils. National planning, and energy economics. 3 lectures. Prerequisite: PHYS 133.

PHYS 313 Introduction to Atmospheric Physics (3) GEB B.1.a.

Properties of the atmosphere, atmospheric motions, solar and terrestrial radiation. Atmospheric optics and cloud physics. 3 lectures. Prerequisite: PHYS 132 or PHYS 122 and MATH 143 or MATH 133 or equivalent.

PHYS 315 Introduction to Lasers and Laser Applications (3) GEB B.1.a.

Interaction of radiation with matter, theory of laser action, characteristics and modification of laser output, types of lasers. Holography and other applications. 3 lectures. Prerequisite: PHYS 133, or PHYS 123 with MATH 133 or MATH 143.

PHYS 317 Special Theory of Relativity (3) GEB B.1.a.

Fundamental experiments and basic postulates of special relativity. Simultaneity, length and time measurements. Lorentz transformations. Four-Vectors. Space-time diagrams. Relativistic mechanics and electromagnetism. 3 lectures. Prerequisite: PHYS 211.

PHYS 323 Optics (4) GEB B.1.a.

Maxwell's electromagnetic equations, light as an electromagnetic wave, refraction and geometrical optics, lenses and lens systems, polarization, interference, diffraction. 3 lectures, 1 laboratory. Prerequisite: PHYS 133, MATH 241.

PHYS 341, 342 Quantum Physics Laboratory I, II (1) (2) GEB B.1.a.

Experimental studies of particles and radiation, their quantum properties and interactions with atoms and nuclei. 1 laboratory, 2 laboratories. Prerequisite: PHYS 243.

PHYS 357 Advanced Instrumentation in Experimental Physics (3)

Advanced analog and digital electronics, computer interfacing to experiments, robotics. 2 lectures, 1 laboratory. Prerequisite: PHYS 206 and PHYS 256.

PHYS 363 Undergraduate Seminar (2)

Study and oral presentation of physics topics of interest to students and faculty. Discussion of projects and research by students and faculty. 2 seminars.

PHYS 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigations, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department chair.

PHYS 401 Thermal Physics II (3)

Additional topics in thermodynamics and statistical physics, including chemical equilibrium, phase transitions, transport processes, and cryogenics. 3 lectures. Prerequisite: PHYS 301.

PHYS 403 Nuclear and Particle Physics (3)

Advanced nuclear physics topics. The two-nucleon problem at low energy. The deuteron. Subnuclear particles and their structure. Elementary particles. Symmetries and conservation laws. Parity, charge conjugation and time reversal invariance. Hadronic interactions. The weak interaction. 3 lectures. Prerequisite: PHYS 212 and PHYS 405.

PHYS 405 Quantum Mechanics I (3)

Wave nature of matter and the basic postulates of quantum mechanics. The wave function, operators, and their interpretation. Schrodinger's equation and its solutions for one dimensional problems. 3 lectures. Prerequisite: PHYS 211, MATH 242. Recommended: PHYS 212, MATH 304.

PHYS 406 Quantum Mechanics II (3)

Angular momentum operators and problems in three dimensions including the hydrogen atom. The elements of matrix mechanics and spin wave functions. Perturbation theory. 3 lectures. Prerequisite: PHYS 405.

PHYS 408, 409 Electromagnetic Fields and Waves I, II (4) (3)

Electric and magnetic field theory using vector analysis. Electric fields, dielectric materials, magnetic fields, induced emf's, magnetic materials, Maxwell's equations, wave equations, plane electromagnetic waves. Dipole radiation, radiation from an accelerated charge. 4 lectures, 3 lectures. Prerequisite: MATH 304, PHYS 206 or consent of instructor.

PHYS 410 Physics of the Solid Earth (3)

Gravity and the figure of the Earth. Body wave seismology, structure and composition of the Earth, heat flow and heat sources, Earth tides, rotational dynamics, the geomagnetic field and its source, paleomagnetism. 3 lectures. Prerequisite: PHYS 133 and MATH 242 or equivalent.

PHYS 412 Solid State Physics (3)

Physics of the solid state of matter. Relationship between atomic bonding and the structural, mechanical, thermal, optical, and electronic properties of solids. Emphasis on those properties that influence electronic behavior and processes in metals, insulators, and semiconductors. 3 lectures. Prerequisite: PHYS 211, MATH 242.

PHYS 413 Advanced Topics in Solid State Physics (3)

Semiconducting devices, including junction and field-effect transistors, LED's, and diode lasers. Magnetic properties of solids. Superconductivity, including discussion of high-temperature superconductors. Other topics of current interest in solid state physics. 3 lectures. Prerequisite: PHYS 412.

PHYS 416 Theoretical Acoustics (3)

Mathematics-based theoretical treatment of vibrations and normal modes; wave equation and solutions; radiation from vibrating sources, resonators and filters; impedance; decibel scale; speech, hearing and psychological acoustics. 3 lectures. Prerequisite: PHYS 132 and MATH 318.

PHYS 423 Advanced Optics (4)

Lens aberrations, interference and diffraction, Fourier optics, quantum optics, image formation and holography, non-linear optics. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: PHYS 323.

PHYS 424 Theoretical Physics (3)

Contour integration in the complex plane, properties of the delta function, properties of some common functions of theoretical physics, Green's function techniques for solving differential equations. 3 lectures. Prerequisite: PHYS 133, MATH 304, MATH 318.

PHYS 452 Solid State Physics Laboratory (1)

Selected experiments on the solid state of matter using electrical, optical, and x-ray methods. 1 laboratory. Prerequisite or concurrent: PHYS 412.

PHYS 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.

PHYS 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

PHYS 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 laboratories. Prerequisite: Consent of instructor.

PHYS 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

PHYS 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

PM–POULTRY MANAGEMENT**PM 200 Special Problems for Undergraduates (2–3)**

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 3 units per quarter. Prerequisite: Consent of department head.

PM 230 Poultry Industry Survey (3)

Modern poultry production processing and marketing. Survey of consumption trends, breeds and consumer grades. Application of management skills, health care, behavior and processing techniques. 3 lectures.

PM 240 Poultry Business Management (3)

Organization and management of vertically integrated poultry operations. Structuring of staffing, cost and profit centers and financial statements. Managing the finance, public relations, production scheduling, product distribution and sales. 3 lectures.

PM 250 Poultry Processing (3)

Processing, value added further processing, quality determination, distribution and merchandising of poultry meat and eggs. Governmental regulations applicable to the processing and marketing of poultry products. Development and promotion of consumer products. 2 lectures, 1 laboratory. Prerequisite: PM 230.

PM 290 Poultry Management Enterprise (2–4) (CR/NC)

Introduction to management techniques of the poultry enterprise. Providing health, nutritional and physical care to a representative group of birds. Planning, budgeting and marketing. Instructor approval required. Total degree credit for 290/490 limited to 9 units. Credit/No Credit grading only. Prerequisite: Consent of instructor.

PM 305 Game Bird Propagation and Management (3)

Habitat needs, management and propagation of North American game bird species in the wild and in captivity. Reproduction, nutrition and maintenance of flock health as practiced by commercial game bird operations. 3 lectures. Prerequisite: One quarter college mathematics, one quarter animal biology.

PM 330 Poultry Production Management (4)

Modern production techniques for the commercial poultry industry. Management of hatcheries, replacement pullets, egg production, and broiler and turkey meat production enterprises. 3 lectures, 1 laboratory. Prerequisite: PM 230.

PM 340 Poultry Anatomy, Physiology and Diseases (4)

Structure, function and pathology of the principal organ systems of domestic poultry. Prevention and control of poultry diseases and parasites. Planning and management of poultry flock health maintenance program. 3 lectures, 1 laboratory. Prerequisite: PM 230.

PM 350 Applied Poultry Feeding and Nutrition (3)

Nutritional requirements, feeding principles and practices as applied to commercial poultry flocks. Least-cost ration formulation, feed manufacturing principles and governmental regulations applicable to the poultry feed manufacturing

industry. 3 lectures. Prerequisite: ASCI 202 or consent of instructor.

PM 360 Poultry Industry Seminar (3)

New trends, management techniques and governmental regulations, special problems and research developments related to the poultry industry. 3 seminars. Prerequisite: PM 230, PM 330 and PM 340.

PM 400 Special Problems for Advanced Undergraduates (2-4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

PM 470 Selected Advanced Topics (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1-3 lectures. Prerequisite: Consent of instructor.

PM 490 Advanced Poultry Management Enterprise (2-4) (CR/NC)

Intensified management of specialized poultry enterprises in all species areas. Application of applied research and progressive husbandry and processing practices employed. Industry contact and visitation encouraged. Total degree credit for 290/490 limited to 9 units. Credit/No Credit grading only. Prerequisite: Consent of instructor.

PM 581 Graduate Seminar in Poultry (3)

Current trends and characteristics of the poultry industry enterprise. Group discussion of skills, techniques and practices to improve teaching of vocational agriculture as it applies to poultry. 3 seminars.

POLS-POLITICAL SCIENCE

POLS 100 Political Inquiry (4)

Introduction to the scope, language, concepts and approaches employed in political science and the social sciences. Includes emphasis on basic methodological and research strategies for assessing political issues, events, and the dynamics of political change. 4 lectures.

POLS 105 Introduction to International Relations (4)

Introduction to the evolution, dynamics and substance of the international system; consideration of such subjects of conflict and accommodation, power and weakness, perception and reality, prosperity and poverty, and war and peace in international relations. 4 lectures.

POLS 200 Special Problems for Undergraduates (1-4)

Individual investigation, research, study, or survey of selected problems under faculty supervision. Total credit limited to 4 units. Prerequisite: Consent of department head.

POLS 204 Basic Concepts of Political Thought (4)

Introduction to such concepts as: law, justice, community, right, citizen, and constitution, which are fundamental to political discourse, as developed in the works of Plato, Aristotle, Augustine, Thomas Aquinas, Machiavelli, and other illustrious thinkers from classic to modern times. 4 lectures. Prerequisite: POLS 210.

POLS 210 American and California Government (3)

GEB D.1.

Study of governmental institutions, politics, issues and political behavior in the United States and California in constitutional, historical, social and cultural perspectives. Contemporary political problems. Satisfies the United States government and California state and local government requirement. 3 lectures.

POLS 250 Model United Nations (2) (CR/NC)

Preparation for participation in the campus Model United Nations. Procedure, MUN rules of debate, preparation of country positions, area papers, and policy statements suitable for use in mock United Nations sessions. Total credit limited to 2 units. Credit/No Credit grading only. 2 lectures. Prerequisite: One course in POLS or consent of instructor.

POLS 301 California State and Local Politics (3)

Political culture, processes, behavior, institutions, public policy and distribution of power in California state and substate governments. 3 lectures. Prerequisite: POLS 210.

POLS 303 Minority Group Politics (3)

Analysis of political factors affecting minority groups in America. Involvement, organization and role of minority groups in the political process. Emphasis on the political behavior of black and chicano minorities. 3 lectures. Prerequisite: POLS 210.

POLS 304 Politics of Global Survival (4)

Consideration of global survival from east-west, north-south and global perspectives. Arms race, development, and the political dimensions of energy, environment, food and population. 4 lectures. Prerequisite: POLS 105 or junior standing.

POLS 305 Political Analysis (4)

Introduction to methodology research design and quantitative methods used in survey research and political analysis. Bi-variate inferential statistics and SPSS statistical computer programs will be used to analyze political phenomena. 3 lectures, 1 activity. Prerequisite: POLS 100 and STAT 211.

POLS 306 Modern Political Thought (3)

Theories of political participation and the relationship between man and the state as developed in the works of influential thinkers such as Locke, Rousseau, Mill and Marx. 3 lectures. Prerequisite: POLS 204.

POLS 307 American Political Thought (3)

Central political ideas of America's leading thinkers from Thomas Paine to the present. 3 lectures. Prerequisite: POLS 204.

POLS 308 Revolutions and Collective Violence (3) (Also listed as SOC 308)

Causes, methods, outcomes of and authority responses to collective violence and revolutionary movements. Contemporary events including terrorist and other forms of collective violence in industrialized and developing nations. 3 lectures. Prerequisite: One course in sociology or political science, or consent of instructor.

POLS 311 Inter-American Relations (3)

Inter-American affairs. Political, economic, and social problems; forces motivating cultural behavior, industrial development, trade techniques, agriculture methods. Finding and evaluating authoritative source materials on Latin American affairs. 3 lectures. Prerequisite: POLS 105, or junior standing.

POLS 312 International Politics (3)

International political processes and problems. Foreign policies and politics in relations between states. Conflicts and adjustments. Analyses of selected problems. 3 lectures. Prerequisite: POLS 105, or junior standing.

POLS 313 National Security Policy (3)

Theoretical approaches to the study of war and peace and the evolution of contemporary defenses and strategies, especially those pertaining to the United States. Impact of national strategy on both national and international politics. 3 lectures. Prerequisite: POLS 105 or POLS 210.

POLS 314 Public Administration (4)

Development of the management functions in government. Survey of administrative concepts and cases. Attention given to national, state and local administrative systems. Case studies and simulations. 4 lectures. Prerequisite: POLS 210.

POLS 321 American Constitutional Law (4)

United States Constitution as interpreted by the Supreme Court. Decisions in the areas of taxation, separation of powers, nature of congressional presidential powers. Emphasis on social, economic and political factors. 4 lectures. Prerequisite: POLS 210.

POLS 322 Civil Liberties (4)

Role of Supreme Court as interpreter of Constitutional rights and liberties, freedom of expression, religion and the press, search and seizure, due process of law. 4 lectures. Prerequisite: POLS 210.

POLS 323 Civil Rights in America (4)

Case-based examination of race, ethnic and gender discrimination in the United States. The course emphasizes the response of the Supreme Court to issues of equality including affirmative action and abortion. 4 lectures. Prerequisite: POLS 210.

POLS 331 Political Parties and Interest Groups (3)

Makeup and major functions of political parties. Role of political parties and interest groups in a democracy. Degree of consensus and conflict between present day political parties and interest groups in their attempts to influence public policy. 3 lectures. Prerequisite: POLS 210.

POLS 332 Public Opinion and Political Participation (3)

Origins and dimensions of public opinion. Focus on contemporary political campaigns and elections in the U.S. Impact of political ideology, mass media, high technology, pressure groups on electoral outcomes. Voting behavior and other forms of political participation in the U.S. 3 lectures. Prerequisite: POLS 210.

POLS 334 Jurisprudence (3) (Also listed as PHIL 334)**GEB C.3.**

Normative and analytic questions about law. Nature of law and legal systems. Justification of law. Moral obligation to obey the law. Nature and justification of punishment. Guilt and legal responsibility, liberty and justice. 3 lectures. Prerequisite: PHIL 230 or PHIL 231.

POLS 335 Legislative Process (4)

Theory and practice of representative government in the United States and other selected political systems. Organization and procedures in Congress, state legislatures and local legislative bodies. Use of simulations will be encouraged. 4 lectures. Prerequisite: POLS 210.

POLS 336 Judicial Process (4)

Examines legal processes, emphasizing political influences on law. Topics may include: types of law, legal culture, state and federal courts, criminal trials, the role of police, judges, attorneys in the legal system. 4 lectures. Prerequisite: POLS 210.

POLS 340 Government Internship (2-12) (CR/NC)

Supervised work experience in a government or related public agency as approved by the school dean. Intern will function as an employee subject to all the duties and responsibilities of employees engaged in comparable work. 30 hours of work experience per unit of credit. Credit/No Credit grading. Recommended preparation: Junior standing with a minimum 2.5 GPA.

POLS 342 The American Presidency (3)

Nature and problems of contemporary presidential leadership emphasizing the impact of bureaucracy, Congress, public opinion, the courts, interest groups, and the party system upon the presidency and national policy making. 3 lectures. Prerequisite: POLS 210.

POLS 350 Advanced Model United Nations (2) (CR/NC)

Participation in the campus Model United Nations. Procedure, MUN rules of debate, preparation of country positions, area papers, and policy statement for use in mock United Nations sessions. Total credit limited to 2 units. Credit/No Credit grading only. 2 lectures. Prerequisite: POLS 250 or consent of instructor.

POLS 370 Contemporary Global Political Issues (3)**GEB D.4.b.**

Coverage of current international political issues. Directed toward making students more aware of issues, problems, tensions in the international arena, relationship of the western and nonwestern countries to these issues, emphasizing both causes and effects. 3 lectures. Prerequisite: POLS 210.

POLS 371 World Food Politics (3)**GEB D.4.b.**

Self-reliant, food-first politics of the hungry poor in the less-developed countries; political support of food policies in the U.S. and other developed nations. Moral, ecological and commodity politics of food in a variety of cultural settings which direct food production, consumption and distribution and reduce food demand through population stabilization. 3 lectures. Prerequisite: POLS 105 or junior standing.

POLS 380 Political Behavior (4)

Political behavior of individuals and groups examined in light of biological, economic, psychological and social-psychological theories and research, including emphasis on the relationship between attitudes and behavior. 4 lectures. Prerequisite: POLS 210.

POLS 382 Comparative Politics (4)

Comparative study of the government of the United Kingdom and other selected Western European and non-Western countries. Emphasis given to comparison of democratic and non-democratic models and traditions. Case studies. 4 lectures. Prerequisite: POLS 105 or POLS 210.

POLS 384 Politics of Developing Areas (3)

Process of political development in the Third World with appropriate examples taken from particular areas and countries. 3 lectures. Prerequisite: POLS 105 or junior standing.

POLS 400 Special Problems for Advanced Undergraduates (1-4)

Individual investigation, research, study, or survey of selected problems. Total credit limited to 4 units. Prerequisite: Consent of department head.

POLS 401 State and Local Government (4)

Theoretical approaches to and structure, function and problems of state, county and local governments, including case studies, simulations and/or computer research exercises. 4 lectures. Prerequisite: POLS 210.

POLS 403 Municipal Government (4)

Concepts, policies and politics in urban governments and organization and power-structure issues of modern American municipalities. Inter-governmental relations, finance, and planning problems in city government. 4 lectures. Prerequisite: POLS 210.

POLS 404 Science, Technology and Public Policy (4)

Techniques for performing technical assessment and impact analysis in communication, transportation, health technologies, aerospace, electronics and other new technologies. Case studies on contemporary problems stemming from the relationship of technology and politics. 4 lectures. Prerequisite: POLS 210.

POLS 405 Politics of Finance and Planning (3)

Economic and political factors affecting federal, state and local governments. Intergovernmental relations and policy considerations in finance, debt management and tax administration. Appropriations and audits in government departments, commissions and agencies. 3 lectures. Prerequisite: POLS 210.

POLS 411 Contemporary U.S. Foreign Policy (3)

Formulation and conduct of U.S. foreign policy. Analysis of the theory and elements of U.S. strategy; diplomacy, propaganda, economic operations, psychological warfare, and military strategies. 3 lectures. Prerequisite: POLS 105 or POLS 210.

POLS 415 Politics in Britain (4)

Politics and processes of government in Britain, the operation of parliamentary government, the responses of the political

system to the issues and problems in contemporary Britain and the Commonwealth. 4 lectures. Prerequisite: POLS 105 or junior standing.

POLS 417 Asian Politics (3)

Analysis of political, economic, and social institutions and conditions in selected Asian nations. 3 lectures. Prerequisite: POLS 105 or junior standing.

POLS 418 Russian Politics (3)

Analysis of political, economic, and social institutions of the former Soviet Union. Emphasis placed on Russia. 3 lectures. Prerequisite: POLS 105 or junior standing.

POLS 425 Public Policy Analysis (4)

Methods of analyzing the intent and action of government. Techniques for evaluating the outputs and impacts of governmental policies. Case studies on various domestic issue areas such as transportation, education, housing, welfare, and law enforcement. 4 lectures. Prerequisite: POLS 210.

POLS 441 Administrative Theory and Behavior (4)

Theories, concepts and case studies related to organizations and to the individuals and groups that work in them. Application of concepts to public and non-profit organizations. Research paper required. 4 lectures. Prerequisite: POLS 210 and POLS 314.

POLS 442 Public Personnel Administration (4)

Concepts, techniques, and issues related to human resource administration. Techniques and concepts for public and nonprofit organizations. Case studies utilized to illustrate issues in the bureaucracy. Research papers on legislation, application, litigation, and other aspects of personnel administration required. 4 lectures. Prerequisite: POLS 210 and POLS 314.

POLS 450 Community Research Seminar (2)

Participation in small groups performing action research requested by one or more community agencies. May include surveys, interviewing, on-site evaluations and computer data analysis. Total credit limited to 6 units. 1 seminar, 1 activity. Prerequisite: POLS 210, junior standing and consent of instructor.

POLS 461, 462 Senior Project (2) (2)

Selection and completion of a project under faculty supervision. Project results presented in a formal paper. Prerequisite: Senior standing (completion of 135 quarter hours), completion of required core courses and concentration. May not be taken CR/NC.

POLS 463 Undergraduate Seminar (3)

Preparation and presentation of current developments in the field of political science. 3 seminars. Prerequisite: POLS 461, POLS 462.

POLS 465 Middle Eastern Politics (4)

Analysis of political, economic, and social institutions of the Middle East and North Africa. Turkey, Iran, Egypt and Israel are used as case studies to illustrate the mosaic of nationalisms that have developed in that region. 4 lectures. Prerequisite: POLS 105 or junior standing.

POLS 468 African Politics (4)

Analysis of indigenous institutions, Western influences, and nationalism in Africa south of the Sahara. Emphasis on post-independence with selective case studies including South Africa. Impact of outside powers on Africa. 4 lectures. Prerequisite: POLS 105 or junior standing.

POLS 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. 1–4 lectures. Prerequisite: POLS 210, junior standing.

POLS 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

POLS 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

POLS 510 Administration in Developing Nations (4)

Processes of administration with reference to the differing cultural, political, and economic environments of the developing areas of the world. Impact of technological developments in emerging nations. 4 seminars. Prerequisite: Graduate standing.

POLS 590 Seminar in Political Science (3)

Special problems in selected areas of Political Science. Each seminar will have a subtitle describing its nature and content. 3 seminars. Maximum of 6 units may be earned. Prerequisite: Graduate standing.

PSC–PHYSICAL SCIENCE**PSC 101 The Physical Environment: Matter and Energy (4) GEB B.1.a.**

Introduction to the basic principles of physical science and application of these principles in modern society. Objects at rest and in motion, energy and power, fluids, heat, light, and sound. 3 lectures, 1 laboratory.

PSC 102 The Physical Environment: Atoms and Molecules (4) GEB B.1.a.

Introduction to the basic principles of the atomic, molecular, and sub-atomic behavior of matter, and applications of these principles in modern society. Electricity and magnetism, electrical nature of matter, organic and inorganic chemistry, modern physics, the nucleus. 3 lectures, 1 recitation. Prerequisite: PSC 101.

PSC 103 The Physical Environment: Earth and the Universe (4) GEB B.1.a.

Introduction to the basic principles of the Earth sciences and astronomy, and applications of these principles in modern society. Structure and formation of the Earth, earthquakes, weather, oceanography, Solar System, stars, and cosmology. 3 lectures, 1 recitation. Prerequisite: PSC 101.

PSC 110 Energy for the Present and the Future (3) GEB B.1.a.

Detailed qualitative presentation of current and future energy sources along with the associated environmental problems. Energy production, energy consumption, efficient use of energy, fossil fuels, nuclear fission and alternative sources such as solar, geothermal and fusion energy. 3 lectures.

PSC 171 Nuclear Weapon Proliferation in the Post Soviet World (3) GEB B.1.a.

Science and technology of fission and fusion weapons, effects of nuclear weapons and nuclear radiation, nuclear proliferation. Nuclear arms treaties and the technology of verification. Nuclear reactor technology. 3 lectures.

PSC 201 Introduction to Physical Oceanography (3) GEB B.1.a.

Origin, extent of oceans. Nature of sea bottom, sediments. Causes, effects of ocean circulation, tides and waves. Physical properties of sea water. Interaction with atmosphere and influence on our climate. Shorelines and shoreline processes. Marine environments. Possible field trips. 3 lectures.

PSC 205 Traces Through Time (3) (Also listed as BIO 205) GEB B.1.a. or B.1.b.

Survey of evidence supporting evolution including origin of the universe, radiometric dating, structure of Earth and plate tectonics. Evolutionary evidence from chemistry, biology, fossils, and the geographical distribution of life. Fundamental differences between science and creationism will be explored. 3 lectures.

PSC 304 Applications of Physical Science (4)

Serious problems faced by technological societies worldwide, such as the destruction of ozone, runaway greenhouse effect, smog, acid rain, water pollution, nuclear radiation hazards, and the depletion of fossil fuels. 3 lectures, 1 activity. Prerequisite: PSC 101, PSC 102, PSC 103 or equivalent.

PSC 424 Organizing and Teaching of Physical Sciences (3)

Techniques, aims and objectives in the teaching of physical sciences and general sciences at the secondary level. Selection and organization of teaching material. Evaluation of results. 3 lectures. Prerequisite: Evidence of satisfactory preparation in physics and chemistry.

PSC 461 Senior Project (2)

Selection and completion of a project under faculty supervision. Project results are presented in a formal report. Minimum of 60 hours total time.

PSY–PSYCHOLOGY

PSY 104 Effective Study Techniques (2) (CR/NC)

Designed to acquaint students with basic aims and objectives of attending college. Provides adequate instruction and practice in specific study skills such as effective study methods, note-taking, time-planning, memory, concentration, reading and test taking. Credit/No Credit grading only. 2 lectures.

PSY 200 Special Problems for Undergraduates (1–3)

Individual investigation, research, study or survey of selected problems in consultation and with prior approval of instructor. Written report required. Total credit limited to 6 units, with a maximum of 3 units per quarter. Prerequisite: PSY 201 or PSY 202 and consent of department head.

PSY 201 General Psychology (3)

GEB E.1.

Introduction to the psychological study of human beings; applications of research in psychobiology, perception, learning, motivation, consciousness, cognition, personality, emotion, development, psychological assessment, social behavior, psychopathology, and psychotherapy. A student may enroll for credit in either PSY 201 or PSY 202, but not both. 3 lectures.

PSY 202 General Psychology (3)

GEB E.1.

Introduction to the psychological study of human beings. Applications of research in psychobiology, perception, learning, motivation, consciousness, cognition, personality, emotion, development, psychological assessment, social behavior, psychopathology, and psychotherapy. A student may enroll for credit in either PSY 202 or PSY 201, but not both. 2 lectures, 1 recitation.

PSY 205 Human Sexuality (3) (CR/NC)

Understanding development of personal sexuality. Sexual identity, biological aspects of sexuality, homosexuality, intimate relationships, communication, sexually transmitted diseases, sexual dysfunction, family planning, abortion. Emphasis on maintaining psychological and physical wellness. Credit/No Credit grading only. 3 lectures.

PSY 212 Interpersonal Communication (4) (Also listed as SPC 212)

Introduction to the interaction process in two-person (dyadic) communication settings. Emphasis on the functions of varying messages in the initiation, development, maintenance and termination of personal and professional relationships. 4 lectures.

PSY 251 Laboratory in Group Activities (1–3) (CR/NC)

Skills and techniques of solving problems in large and small groups. Conducting and reporting meetings. Analyses of leadership dynamics in campus organizations. Credit/No Credit grading only. Total credit limited to 6 units. 1–3 activities.

PSY 252 Social Psychology (4)

How attitudes, beliefs, and behavior are affected by the social situation. Gender roles, prejudice, aggression, altruism, attitudes and persuasion, liking and loving, and group behavior. Use of social psychology to reduce racism

and sexism and international conflict, improve relationships, and communicate persuasively. 4 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 254 Family Psychology (4)

Examination of methodology, theory, and domains of family psychology with emphasis on family behavior as related to clinical, public policy, and professional issues. 4 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 256 Developmental Psychology (4)

Introduction to the scientific study of development with emphasis on the lifespan, from conception to death. Basic research and concepts in development. Application of developmental principles to individuals and their interactions with others in the environment. 4 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 301 Psychology of Personal Development (3)

Approaches to self-exploration and self-modification. Conceptions of human potential. Evaluation and development of personal effectiveness. 3 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 302 Behavior in Organizations (3)

Characteristics of functioning organizations and their effects on individuals. Psychological issues relevant to the maintenance of the organization. Motivation, leadership, group phenomena, communication, decision-making, attitudes, personnel selection and organizational change. 3 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 303 Family Interaction (3)

Examination of the building blocks of family interaction that produce a distinctive family style or set. 3 lectures. Prerequisite: HD 203 or PSY 254, junior standing.

PSY 304 Physiological Psychology (3)

GEB E.2.

Relationship between physiological and behavioral processes. Learning, motivation, emotion, perception, individual differences, social and abnormal behaviors as a function of the nervous and endocrine systems, sensory structures, genetic factors, effects of drugs. 3 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 305 Personality (3)

Personality theories and research. Human motivation and emotions, description and development of personality characteristics. Adjustment and self-actualization. 3 seminars. Prerequisite: PSY 201 or PSY 202, junior standing.

PSY 309 Psychology of Consciousness (3)

Characteristics and functions of selected, qualitatively unique patterns of consciousness such as hypnosis, meditation, dreaming, drug experiences and parapsychological phenomena, with particular emphasis on adaptive and maladaptive expressions of these states of consciousness. 3 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 310 Death, Dying and Bereavement (3)

Scientific and experiential investigations of dying and bereavement. Cross-cultural, historical, medical, legal, and developmental perspectives. Care of the dying, grieving, funerals, suicide, euthanasia. Meaning of life in the context of death. 3 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 311 Environmental Psychology (3)

Interrelationship between behavior and the built and natural environments. Evaluating and understanding environments, environmental stress, and the human aspects of environmental problems. 3 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 314 Psychology of Women (3)

Central issues in feminine psychology including stereotypes, gender differences, sex-roles, sex-typing, female sexuality, pregnancy and childbirth, women as victims, mental and emotional disorders of women, and aging. 3 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 315 Psychology of Men (3)

Central issues in male psychology including stereotypes, gender differences, sex-roles and their development, sex and role typing, male sexuality and models of masculinity. Health, mental and emotional disorders of men, and aging. 3 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 317 Psychology of Stress (3)

Examines the present status of research in psychology on the relationship between stress and psychological and physical well-being. Psychological factors influencing stress. Description and critical evaluation of methods of stress reduction. Miscellaneous course fee required—see *Class Schedule*. 3 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 318 Psychology of Aging (3)

Psychological and physiological aging in the context of the culture. Theories and research relating to positive and negative changes in perception, learning, memory, intelligence, personality, identity, motivation, sexuality, family relationships, career. Disorders, institutionalization, death and bereavement, coping strategies. 3 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 319 Motivation (3)

Physiological, sociobiological, behavioral, humanistic and cognitive theories of motivation. Practical applications of each theory to personal and societal behaviors. Research evaluating each theory. 3 lectures. Prerequisite: PSY 201 or PSY 202 and junior standing.

PSY 320 Nonverbal Communication (4) (Also listed as SPC 320)

Influence of kinesic, proxemic, artifactual, olfactory, paralinguistic and environmental factors in human communication. Theory, research and practice in nonverbal communication. 4 lectures. Prerequisite: SPC 212 or consent of instructor.

PSY 323 The Helping Relationship (4)

Basic skills and approaches common to helping relationships with children, adults, and families. Examines theoretical, empirical, and practical applications of helping. Differentiation between professional, paraprofessional, and nonprofessional helping relationships. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: Junior standing, Ethnic Studies course, HD 102, HD 130, or consent of instructor.

PSY 327 Human Dimension of Leisure (3) (Also listed as REC 327)

Philosophical, psychological, and cultural aspects of leisure wellbeing and behavior. Cultural diversity as it relates to recreation and leisure. Needs, interests, barriers, values and patterns explored. 3 lectures. Prerequisite: REC 252.

PSY 329 Research Methods in Psychology and Human Development (5)

Introduction to research methods used in psychology and human development. Topics include experimental, correlational, survey, designs, library search procedures, basic statistical procedures, writing the research paper, and matching statistics to the research design. 3 lectures, 2 activities. Prerequisite: PSY 201 or PSY 202, or consent of instructor.

PSY 330 Behavioral Effects of Psychoactive Drugs (3)

Behavioral effects of the major categories of drugs. Factors influencing a person's choice to use and abuse drugs; personal and social consequences of abuse of alcohol and other drugs. 3 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 351 Group Dynamics (4)

Dynamics of small groups. Topics include functions of groups, group structure, power, leadership, intragroup conflict, personal space and territoriality, groups as agents of societal and personal change. Demonstrations emphasizing experiential learning in groups. 2 lectures, 2 activities. Prerequisite: PSY 252 and PSY 323.

PSY 359 Applied Psychology Research Methods (4)

Methods of testing hypotheses and evaluating social interventions in real-world settings. Interview, survey, correlation, field experimental, and quasi-experimental methods. Program evaluation. Experience with data collection and computer analysis. 3 lectures, 1 activity. Prerequisite: PSY 329.

PSY 380 Issues in Family Psychology: Past, Present, Future (4)

Examination of the role that historical change has played in the shaping of today's family. Analysis of the implications for family psychologists. 4 seminars. Prerequisite: PSY 254 or HD 203.

PSY 400 Special Problems for Advanced Undergraduates (1–3)

Individual investigation, research, study or survey of selected problems in consultation and with prior approval of instructor. Written report required. Total credit limited to 6 units, with a maximum of 3 units per quarter. Prerequisite: PSY 201 or PSY 202 and consent of department head.

PSY 405 Abnormal Psychology (3)

Abnormal behavior of individuals. Dynamics, etiology, symptoms, treatment and prevention of the more severe personality and behavior disorders. Includes organic mental disorders; substance abuse; psychoses; affective, anxiety, psychosexual, psychosomatic and personality disorders. 3 lectures. Prerequisite: PSY 201 or PSY 202.

PSY 413 Parent-Child Relationships (3)

Application of major theories to understanding of parent-child relations. Examination of primary prevention strategies and programs. Review of current research and evaluation of literature on parent-child interactions. 3 lectures. Prerequisite: PSY 256 or HD 209, junior standing.

PSY 419 Development of Self and Individuality (3)

Concepts, theories, and research related to the development of the self across the lifespan. Examination of the influence of temperament, individuation, ego strengths, self-awareness, roles and identity on the development of individuality. 3 seminars. Prerequisite: PSY 256 or consent of instructor.

PSY 420 Social and Emotional Development (3)

Analysis of the development of social interaction and emotional processes across the lifespan. Research and theories on such behaviors as attachment and love, empathy and altruism, competition and aggression, peer relations and cooperation. 3 seminars. Prerequisite: PSY 256 or consent of instructor.

PSY 421 Cognitive Development (3)

Examination of significant processes in the development of cognition across the lifespan. Theory and research regarding Piagetian theory, information processing, problem solving, creativity, and language development. Educational and counseling applications. 3 seminars. Prerequisite: PSY 256 or HD 209 or consent of instructor.

PSY 422 Lifespan Sexuality (3)

Sexual interest, activity, and functioning from birth through the late adult years. Influence of sexual roles, attitudes, and adaptation during the life span. Sexual practices in our society. Therapies for enhancing a comfortable sexuality. 3 lectures. Prerequisite: PSY 201 or PSY 202, or PSY 205, and junior standing.

PSY 429 Experimental Psychology (4)

Research methodology and experimental design. Application of descriptive and inferential statistics to data from various content areas including development, animal and human learning, memory, cognition, and psychophysical processes. 3 lectures, 1 laboratory. Prerequisite: PSY 329, junior standing or consent of instructor.

PSY 432 Psychological Testing (3)

Principles and procedures of selection, administration, scoring, and interpretation of achievement tests, aptitude tests including scholastic aptitude, interest inventories, and personality inventories. 3 lectures. Prerequisite: PSY 201 or PSY 202, junior standing.

PSY 444 The Atypical Infant (4) (Also listed as EDUC 444)

Exploration of issues pertinent to the development of atypical infants. Relationship of theory and research to intervention efforts with handicapped, developmentally delayed infants, and other at-risk infants. 3 seminars, 1 activity. Prerequisite: Junior standing, PSY 256 or HD 209, and EDUC 440 or consent of instructor.

PSY 450 Family Therapy and Crisis Intervention (4)

Basic elements of marriage and family therapy and crisis intervention. Emphasis on concepts, goals, and techniques of

various family therapy approaches and family crisis intervention. 4 lectures. Prerequisite: PSY 254, PSY 405, or graduate standing.

PSY 453, 454 Supervised Fieldwork (6) (6) (CR/NC)

Supervised fieldwork experience in various community, governmental, and educational settings. Applied psychological, developmental, or educational experiences determined by participating institution, supervising faculty member, and student. Maximum of 6 units per quarter. Credit/No Credit grading only. Prerequisite: PSY 323, HD majors, junior standing in Human Development, and consent of instructor.

PSY 456 Behavioral Disorders in Children (3)

Applications of psychological principles to childhood behavioral disorders. Aggression, delinquency, stress reactions, motivational, perceptual-attentional deficiencies, psychoses, anxiety disorders, biological dysfunctions, and retarded social and cognitive development. 3 seminars. Prerequisite: PSY 201 or PSY 202, junior standing.

PSY 457 Memory and Cognition (3)

Principles and theories of memory and cognition including serial versus parallel processing models of memory, memory stores, metamemory, concept formation, language, expert-novice differences in cognition, social cognition; applications to areas such as eye witness testimony, education and aging. 3 lectures. Prerequisite: PSY 201 or PSY 202, junior standing.

PSY 458 Learning (3)

Principles of classical, operant and avoidance conditioning; complex learning processes including choice and stimulus control. Theoretical basis for behavior therapy techniques such as contingency management, response elimination and extinction, punishment and aversion procedures. 3 seminars. Prerequisite: PSY 201 or PSY 202, junior standing.

PSY 459 Lifespan Theories (3)

Comparative study of theories that attempt to explain life span development. Controversial issues, evaluations and applications of theories. Emphasis on biological, psychological, and social aspects of life span development. 3 seminars. Prerequisite: PSY 201 or PSY 202, HD 209 or PSY 256, or consent of instructor, senior standing.

PSY 460 Child Abuse and Neglect (3)

Issues in child maltreatment, including definitions and forms, causes, consequences, assessment, reporting, treatment, and prevention. Possible links among research, intervention, and public policy will be emphasized. 3 seminars. Prerequisite: PSY 201 or PSY 202 and junior standing.

PSY 461 Senior Project Seminar (1)

Discussion of occupational and graduate school opportunities and of current issues in psychology for the purpose of defining professional objectives and individual projects for PSY 462. Senior project progress reports with class critique. 1 seminar. Prerequisite: PSY 329, PSY 453, Graduation Writing Requirement, and consent of instructor.

PSY 462 Senior Project (3)

Design and completion of a faculty-supervised project in psychology. The project must be presented in a formal,

written report. Minimum of 90 hours total time. Prerequisite: PSY 329, PSY 453, Graduation Writing Requirement, and consent of instructor.

PSY 465 Cross-Cultural Issues in Psychology (3)

Psychological, biological and ecological influences on human development in different cultural settings. Focuses on: 1) cognitive development/teaching and learning; 2) attitudes and belief; 3) health and growth; and 4) social and psychological aspects of cultural patterns. Course will have a focal cultural area for each quarter. *Class Schedule* will list topic selected. 3 seminars. Prerequisite: PSY 201 or PSY 202 and junior standing.

PSY 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

PSY 481 Family Theory (3)

Critical analysis and discussion of the current theories used to explain family behavior including their application in the helping professions and family research. 3 seminars. Prerequisite: Senior standing.

PSY 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

PSY 494 Psychology of Technological Change (3)

Examines the impact of technological change on the psychological and social characteristics of people and organizations. Identifies personal, social and organizational factors which provide obstacles and opportunities for technological change. Survey of methods of reducing the negative impact of change. 3 seminars. Prerequisite: PSY 201 or PSY 202 and senior standing.

PSY 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

PSY 496 Applied Social Psychology (4)

Survey of methods of applied social psychology and applications to education, business and industry, environmental problems, health systems, law, mass communication, politics, and international relations. Oral and written reports of student investigation and analysis of social and organizational problems. 4 seminars. Prerequisite: PSY 252, PSY 302, PSY 329.

PSY 500 Individual Study (1–6)

Advanced study planned and completed under the direction of a member of the department faculty. Open only to graduate students who have demonstrated ability to do independent work. Enrollment by petition. Only 6 units may be applied to degree requirements. Prerequisite: Consent of department head, graduate major adviser and supervising faculty member.

PSY 504 Psychoneurology and Pharmacology (3)

Advanced study of neuropsychological and pharmacological concepts including neuroanatomical systems, neurochemical processes, brain dysfunctions, basic neurological assessment, alcohol and psychoactive substance abuse, antidepressants, antianxiety agents, antipsychotics. Current theoretical perspectives and research findings will be reviewed. 3 seminars. Prerequisite: PSY 304, PSY 330, graduate standing or consent of instructor.

PSY 555 Counseling and Communication (4) (Also listed as EDUC 555)

Overview of the counseling profession, history, philosophy, theory, and ethics. Emphasis on developing interviewing, assessment and communication skills. Required practicum. 3 seminars, 1 activity. Prerequisite: Graduate standing or consent of instructor.

PSY 560 Counseling Theories and Assessment (4) (Also listed as EDUC 560)

Counseling theories and concepts applied to individuals. Develop skills in interviewing, assessment, intervention selection, termination and crisis intervention. Ethics and law included. 3 seminars, 1 activity. Prerequisite: EDUC/PSY 555, PSY 305 or consent of instructor.

PSY 561 Group Counseling (3) (Also listed as EDUC 561)

Theory and practice of group counseling, client selection, group structure, process and termination. Application of theories to specific developmental groups. Communication and facilitation skills emphasized with relevant ethics and law. 2 seminars, 1 activity. Prerequisite: EDUC/PSY 555, EDUC/PSY 560 or consent of instructor.

PSY 564 Ethics and the Law: MFC Counseling (3)

Ethics, client rights, and laws related to individual, child, family and group therapy counseling. 3 seminars. Prerequisite: EDUC/PSY 560, EDUC/PSY 561, PSY 450 or consent of instructor.

PSY 565 Diagnosis and Treatment: Psychopathology (4)

Assessment of mental status. Diagnostic and statistical Manual of Mental Disorders, treatment planning, treatment case documentation and research applied to client psychopathology. 3 seminars, 1 activity. Prerequisite: EDUC/PSY 560, PSY 405, PSY 432, or consent of instructor.

PSY 566 Group Therapy (3)

Group therapy theory, leadership and research applied to client assessment, screening, treatment selection, evaluation and termination. Ethics, law included. 2 seminars, 1 activity. Prerequisite: EDUC/PSY 560, EDUC/PSY 561 or consent of instructor.

PSY 567 Counseling the Elderly and Their Families (3)

Dynamics of aging and family transitions as applied to counseling. Application of medical, psychological, DSM III, physiological, crisis and ethnic concerns with a required practicum. 2 seminars, 1 activity. Prerequisite: EDUC/PSY 555, PSY 419, PSY 420, PSY 421 or PSY 459 or consent of instructor.

PSY 568 Advanced Psychotherapies (3)

Theory and application of advanced approaches in psychotherapy, including: cognitive-behavioral therapies, psychodynamic therapies and humanistic/existential therapies. Class schedule will list therapy selected. Total credit limited to 9 units. 3 seminars. Prerequisite: EDUC/PSY 560 or consent of instructor.

PSY 569 Counseling Clinic Practicum (6)

Applied experience and instruction in assessment, diagnosis, treatment planning and treatment of individuals, couples, families and children under direct supervision of faculty in Cal Poly's Counseling Clinic. Ethical and legal practices included. Weekly meetings. Total credit limited to 18 units. A maximum of 12 units may be applied to the Master of Science in Psychology. Prerequisite: EDUC/PSY 560, PSY 405, PSY 450, PSY 459, or consent of instructor.

PSY 570 Selected Topics in Psychology and Human Development (3)

Directed group study of selected topics for advanced students. Open to graduate students and selected seniors. *Class Schedule* will list topic selected. Total credit limited to 6 units. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

PSY 571 Advanced Marital and Family Therapy (4)

Theory and application of process, structural and systems approaches to family and couple therapy. Assessment, diagnosis, treatment and follow-up of family and couple therapy with required supervised activities. Ethics and law related to family therapy. 3 seminars, 1 activity. Prerequisite: PSY 450, EDUC/PSY 555 or consent of instructor.

PSY 572 Child and Adolescent Therapy (4)

Assessment, diagnosis, treatment planning and therapeutic modalities appropriate for children and adolescents. Seven hours of instruction in abuse and neglect of children with relevant ethics and law. Effective parenting approaches and integration of family treatment. 3 seminars, 1 activity. Prerequisite: EDUC/PSY 560, EDUC/PSY 561, PSY 405, PSY 456 or consent of instructor.

PSY 573 Field Experience: Counseling (6)

Practical application of guidance services and counseling in public schools, colleges and community settings. Weekly seminars with university staff included. Total credit limited to 24 units. Prerequisite: EDUC/PSY 555, EDUC/PSY 557 and consent of M.S. program committee.

PSY 574 Applied Psychological Testing (3)

Commonly used psychological tests, report writing and communication of test results to clients and other professionals. Administering, scoring, and interpreting self-report inventories used in public and private agencies for

marriage and family counseling. 3 seminars. Prerequisite: PSY 432.

PSY 575 Sexual Dysfunction Therapy (3)

Analysis of physiological, social, and psychological antecedents to sex role identity. Sexual behavior, disease, sexual dysfunction. Assessment, diagnosis, and treatment of sexual dysfunction. Ethics. 3 seminars. Prerequisite: EDUC/PSY 560 and PSY 450.

PSY 576 Field Experience: Marital and Family Counseling (6)

Supervised practicum in applied psychotherapeutic techniques, assessment, diagnosis, prognosis and treatment of pre-marital, marital, family and child relationships dysfunctions with licensed supervisor. Total credit limited to 24 units. Weekly seminar with on-site and university supervisors. 30 hours work experience per unit of credit. Prerequisite: PSY 569, consent of instructor and M.S. program committee.

PSY 585 Research Methods for Counseling Psychology (4)

Research methods relevant to practitioners in counseling psychology and human services. Develop the ability to design, carry out and evaluate pertinent psychological research. Basic understanding of descriptive and inferential statistics and the use of computers in the analysis of data. 2 seminars, 2 activities. Prerequisite: PSY 573 or PSY 576 or consent of instructor.

PSY 586 Cooperative Education Experience (6) (CR/NC)

Advanced study analysis and part-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

PSY 590 Research Applications in Psychology and Human Services (4)

Application of research techniques to problems in psychology and human services. Emphasis on the design of data collection instruments, data collection and data analysis in an applied research project. 2 seminars, 2 activities. Prerequisite: PSY 585.

PSY 596 Cooperative Education Experience (12) (CR/NC)

Advanced study analysis and full-time work experience in student's career field; current innovations, practices, and problems in administration, supervision, and organization of business, industry, and government. Must have demonstrated ability to do independent work and research in career field. Total credit limited to 9 units. Credit/No Credit grading only. Prerequisite: Graduate standing and consent of instructor.

PSY 599 Thesis or Project (3)

Completion of a thesis or research project pertinent to the fields of psychology and human services. Supervision. Prerequisite: PSY 590.

REC-RECREATION ADMINISTRATION

REC 100 Leisure Education and Lifestyle Management (2) GEB E.2.

Exploration of the impact of work, play, and leisure upon society. Analysis of theoretical views of play and the relationship of positive leisure values upon the development of a well-integrated lifestyle. Foundations for understanding and assessment of personal leisure well-being. 1 lecture, 1 recitation.

REC 101 Introduction to Recreation and Leisure Services (3)

History, philosophy, theory, and organization of recreation and leisure services. Emphasis upon functions, areas, facilities, clientele, and career opportunities. Field visits required. 3 lectures.

REC 105 Recreation Leadership (3)

Recreation leadership with small and large groups. Emphasis upon leadership skill development, appropriate theories and techniques for specific clientele. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 laboratory.

REC 110 Career Development and Planning in Recreation Administration (1) (CR/NC)

Development and application of philosophy, learning strategies, and problem solving for career planning in Recreation Administration. Credit/No Credit grading only. 1 activity. Prerequisite: consent of instructor.

REC 210 Introduction to Program Design (4)

Methods of program planning, organization, implementation and evaluation in public and private settings. Interrelationship of needs and interests of people, physical settings, and activity content. Emphasis on program construction and scheduling in social recreation, cultural arts, health and fitness and sport/games areas. 2 lectures, 2 activities. Prerequisite: REC 101, REC 105 or consent of instructor.

REC 252 Leisure and Special Populations (3)

Introduction to special populations. Exploration of disability rights issues. Specialized leadership and communication techniques. Modification requirements for programs, areas, facilities, equipment, and supplies. Introduction to Americans With Disabilities Act and its implications for recreation and leisure services. Field visits required. 3 lectures. Prerequisite: REC 210 or consent of instructor.

REC 260 Intramural and Recreational Sports (3)

Philosophy, foundations, policy and techniques underlying intramurals and recreational sport programs in schools, public, private and commercial settings. 2 lectures, 1 activity. Prerequisite: REC 210 or consent of instructor.

REC 302 Environmental Education (3)

Environmental education and teaching techniques that apply to learning experiences in an outdoor environment. Impact of natural resource usage that affects biological and physical resources. Educational strategies for presenting environmental learning to grades K-12 and selected learning environments. 2 lectures, 1 activity. Prerequisite: REC 210, BOT 121.

REC 310 Program Administration in Leisure Services (4)

Management of special events delivery system in a variety of settings. Needs assessment, program selection, program promotion, and evaluation analyzed. Special event program design developed. Field trips required. 4 lectures. Prerequisite: REC 210.

REC 312 Employee Services and Recreation (3)

Administrative patterns, financing, programming, personnel, and legal concerns in programs designed to utilize leisure for employee motivation and productivity. Analysis of military, corporate, agency programs. Field visits required. 3 lectures.

REC 314 Travel and Tourism Planning (4)

The history and development of tourism. Emphasis on the impact of tourism activity on individual cultures and the natural environment. Environments examined include urban, rural, and National and local park systems. Travel motivations, travel research and planning models. Field visits required. 4 lectures. Prerequisite: REC 210.

REC 317 Conventions and Meeting Management (3)

Role of conventions and meeting management in the area of tourism. Factors involved in meeting planning for small and large groups to include committees, amenities, logistics of operations and evaluation. Field visits required. 3 lectures. Prerequisite: REC 210.

REC 324 Legal and Managerial Patterns in Recreation Administration (3)

Scope, levels, concepts, structure, and legal aspects of public, private, commercial, and non-profit recreation and leisure services agencies. Risk management and ethics. Emphasis on the development of a professional philosophy. Field visits required. 3 lectures. Prerequisite: REC 210.

REC 327 Human Dimension of Leisure (3) (Also listed as PSY 327)

Philosophical, psychological, and cultural aspects of leisure wellbeing and behavior. Cultural diversity as it relates to recreation and leisure. Needs, interests, barriers, values and patterns explored. 3 lectures. Prerequisite: REC 252.

REC 330 Directed Field Experience (3) (CR/NC)

Practical work experience in related phases of recreation administration in organization or agency under qualified supervision. Minimum of nine hours per week. Credit/No Credit grading only. Total credit limited to 9 units. Prerequisite: REC 210 and consent of instructor.

REC 400 Special Problems For Advanced Undergraduates (1-3)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 3 units per quarter. Prerequisite: Consent of curriculum coordinator.

REC 424 Financing Recreation and Leisure Services (4)

Financing leisure products and services in public, private, commercial and voluntary settings. Emphasis on sources and methods of financing; grant development; operational/financial cost analysis; forecasting, budgeting, pricing and fiscal master planning through use of computer technology. 2 lectures, 2 laboratories. Prerequisite: ACTG 211, REC 324.

REC 460 Research in Recreation Administration (4)

Research design, questionnaire and interview schedule construction, sampling methods, data array and analysis, and computer applications. Selection and preliminary investigation of senior project topic. 4 seminars. Prerequisite: CSC 113 or AG 250, SOC 333 or PSY 329, STAT 211.

REC 461, 462 Senior Project (3) (2)

Selection and completion, under faculty supervision, of an investigative project typical of problems which graduates must solve in their fields of employment. Required minimum of 150 hours. Analytical, formal report is required. Prerequisite: Senior standing and completion of REC 460.

REC 464 Organization and Development of Commercial Leisure Services (4)

Historical and contemporary development of the domains of commercial recreation and related services. Role of entrepreneurial activity. Procedures for creating and managing a socially responsible commercial leisure service. 3 lectures, 1 laboratory. Prerequisite: ACTG 211, and senior standing.

REC 465 Internship (6) (CR/NC)

400 hours of full-time concentration-specific practical work experience over a ten-week period in an approved agency. Comprehensive involvement in agency program. Not open to T R Concentration students. Credit/No Credit grading only. Prerequisite: Minimum GPA of 2.0; 1,000 verified hours of adviser-approved paid and/or volunteer experience subsequent to high school; completion of all university coursework other than Internship; approval of Curriculum Coordinator.

REC 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 lectures. Prerequisite: Consent of instructor.

REC 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to graduate and undergraduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 laboratories. Prerequisite: Consent of instructor.

REC 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

REC 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

RELS–RELIGIOUS STUDIES**RELS 304 Judaism (3)****GEB C.3.**

Origin, beliefs and practices of Judaism and central themes in the Hebrew Bible. The relation of Judaism to other religions in the ancient Near East, such as the Zoroastrian and Egyptian traditions. The emergence of modern Judaism and Zionism. 3 lectures. Prerequisite: ENGL 125 or PHIL 125 or SPC 125, and PHIL 230 or PHIL 231 or permission of the instructor.

RELS 305 Christian Origins (3)**GEB C.3.**

Origin, belief and practices of Christianity. Its early roots in the Messianic idea in Judaism. The Gospels, the life and ministry of Jesus, the letters of Paul, the development of the Catholic Church, heresies, and apocalypticism will be emphasized. 3 lectures. Prerequisite: ENGL 125 or PHIL 125 or SPC 125, and PHIL 230 or PHIL 231 or permission of the instructor.

RELS 306 Hinduism (3)**GEB C.3.**

Origin, beliefs and practices of the *Veda* and the *Upanisads*. The teachings of the *Bhagavad Gita*. The six systems of Hindu philosophy. Modern Hindu institutions and social philosophy. Encounter with heterodox religions, such as the Jains and Sikhs. 3 lectures. Prerequisite: ENGL 125 or PHIL 125 or SPC 125, and PHIL 230 or PHIL 231 or permission of the instructor.

RELS 307 Buddhism (3)**GEB C.3.**

Origin, beliefs, and practices of Buddhist traditions. The life of Gautama, the historical Buddha. Philosophies of Theravada, Mahayana and Tantrism. Development of Buddhism in China, Tibet, Japan, Southeast Asia. American encounter with Taoist, Shinto and Confucian traditions. 3 lectures. Prerequisite: ENGL 125 or PHIL 125 or SPC 125, and PHIL 230 or PHIL 231 or permission of the instructor.

RELS 308 Islam (3)**GEB C.3.**

Beliefs, ethics and religious practices of Islam. Historical development of the Islamic tradition from the Prophet Muhammad. 3 lectures. Prerequisite: ENGL 125 or PHIL 125 or SPC 125, and PHIL 230 or PHIL 231 or permission of the instructor.

SCM–COLLEGE OF SCIENCE AND MATHEMATICS**SCM 100 Orientation to the College of Science and Mathematics (2) (CR/NC)**

Application of learning strategies, problem-solving methodologies, academic planning and career selection for students in the science and mathematics disciplines. Concurrent enrollment in specific orientation or content course is desirable. Credit-No Credit grading only. 1 lecture, 1 activity.

SCM 300 Early Field Experience, Science/Mathematics (2) (CR/NC)

A minimum of 20 hours of supervised observation of secondary school science or mathematics classes. These observations will be discussed and evaluated during weekly meetings. Credit/No Credit grading only. 2 lectures.

SOC—SOCIOLOGY

SOC 105 Introduction to Sociology (3) GEB D.4.a.

The groups and societies humans build and how these affect our behavior. Special attention is given to the analysis of how factors such as gender, race or ethnicity, income, and occupation interact with the five basic social institutions of society: family, economy, government, religion and education. 3 lectures.

SOC 106 Social Problems (3)

Description and analysis of the social problems facing contemporary society; includes such topics as ethnic and gender inequality, poverty, pollution, and warfare. 3 lectures.

SOC 301 Social Work in the U.S.A. (3)

Introduction to the field of social welfare. Development of American social work. Scope and diversity of specific programs designed to meet welfare problems in contemporary society. 3 lectures. Prerequisite: One course in sociology or consent of instructor.

SOC 302 Social Welfare Institutions (3)

Development of public welfare services; current problems and policy issues; analysis of current programs of social insurance, public assistance programs; interagency relationships. 3 lectures. Prerequisite: SOC 301 or consent of instructor.

SOC 305 Sociology of Social Movements (3)

Analysis of the causes and impact of social movements, with a focus on the contemporary world. Included are events ranging from riots, lynchings and panics to political, religious and racial social movements. 3 lectures. Prerequisite: 3 units of sociology or consent of instructor.

SOC 306 Sociology of the Family (3)

Analysis of basic concepts of family structure. Types of families, marriages, conjugal relations and kinship. Emphasis on the dynamic nature of family interaction and its correlates: social class, ethnicity, communication patterns, family size, and conflict. 3 lectures. Prerequisite: SOC 105 or consent of instructor.

SOC 308 Revolutions and Collective Violence (3) (Also listed as POLS 308)

Focus on the causes, methods, outcomes of, and authority responses to collective violence and revolutionary movements. Contemporary events including terrorist and other forms of political violence in industrialized and developing nations. 3 lectures. Prerequisite: One course in sociology or political science, or consent of instructor.

SOC 309 The World System and Its Problems (3) GEB D.4.b

Analysis of the historical background, structure, and dynamics of the world system; examines such issues as the origins of Third World poverty, the changes in the world's dominant economic powers, and possible strategies for the economic development of the Third World. 3 lectures.

SOC 310 Self, Organizations and Society (3)

Analysis of the nature and development of the self. Includes the emotions, drives and other biological influences on

behavior, socialization and social interaction, social and gender roles, and the reciprocal influences between individuals, organizations, and society. 3 lectures. Prerequisite: Junior standing, or consent of instructor.

SOC 311 Sociology of Gender (3)

Description and analysis of the impact of gender definitions on men and women in society. Special attention is given to the learning process; the creation and perpetuation of gender stereotypes and the way these affect individual life chances and social structure, explored in the areas of work, education and family. Focus on media presentation of gender and effects of ethnicity and class. 3 lectures. Prerequisite: One course in sociology or consent of instructor.

SOC 313 Urban Sociology (3)

An examination of the history of the city. The causes and effects of urbanization; analysis of the physical structure of the community, patterns of social class, power, and segregation and their effects. Changing patterns of urban community life. 3 lectures. Prerequisite: One sociology course or consent of instructor.

SOC 315 Race and Ethnic Relations (3) GEB D.4.b.

Diverse structures of unequal relationships among racial and ethnic groups in several countries including the U.S. Theories about sources of economic and social discrimination and colonialism. Focusing on the concept of ethnicity. Evaluation of methods to restructure race and ethnic relations. International case histories. 3 lectures. Prerequisite: Junior standing.

SOC 316 American Ethnic Minorities (3)

Exploration of the issues and problems affecting the four major ethnic minorities in American society: Native Americans, Afro-Americans, Hispanics and Asian Americans. Dynamics of intergroup relations focusing on the concepts of ethnocentrism, stereotyping, pluralism and assimilation. Sources and manifestations of economic and social discrimination patterns and how they affect the individual's life course. 3 lectures. Prerequisite: One course in sociology or consent of instructor.

SOC 323 Social Stratification (3)

Social class and the distribution of status and power in society, with emphasis on contemporary United States; social mobility; relationships of stratification to mental illness, race and ethnicity, gender, family systems, crime and delinquency. 3 lectures. Prerequisite: One course in sociology or consent of instructor.

SOC 326 Sociology of Aging (3)

Age as a social phenomenon. Roles of the elderly in industrial societies. Changes in social structures and people as the shift occurs from middle to older age. Sociological theories about aging. Implications of an aging population. Public policies and aging. 3 lectures. Prerequisite: One course in sociology or consent of instructor.

SOC 330 Social Change (3)

Description and analysis of social change in contemporary American society as it relates to major revolutionary changes in this century; variables alleged to affect social change; impact of social change upon traditional societies; prospects

for future social change. 3 lectures. Prerequisite: One course in sociology or consent of instructor.

SOC 333 Social Research Methods I (3)

The basics of how to do social research with an emphasis on formulating research questions and collecting data. Includes such topics as sampling and interview techniques. 3 lectures. Prerequisite: Two sociology courses and STAT 211 with a grade of C or better, or consent of instructor.

SOC 334 Social Research Methods II (3)

The basics of how to do social research with an emphasis on the analysis of data. Includes training in the use of statistical computer programs. 2 lectures, 1 laboratory. Prerequisite: SOC 333.

SOC 344 Sociology of Poverty (3)

Variable indicators of poverty in modern society. Chief features of the subculture of the poor. Analysis of different explanations for the persistence of poverty. Survey of proposals for reducing poverty. 3 lectures. Prerequisite: One course in sociology or consent of instructor.

SOC 350 Social Organization of Modern Japan (3)

Social and cultural features of modern Japan. Japanese group processes. Investigation of contemporary Japanese institutions: family, education, mass media, industry, politics, including an overview of popular culture. 3 lectures. Prerequisite: One course in sociology or consent of instructor.

SOC 351 Women in East Asia (3)

Traditional roles and status of women in Chinese, Japanese and Korean societies. Changes due to industrialization, the impact of Western ideas and their implications for today's women. 3 lectures. Prerequisite: One sociology course at the 100/200 level or consent of instructor.

SOC 395 Sociology of Complex Organizations (3)

Bureaucracies and informal organizations from a sociological perspective. Organizational networks within and between organizations, relationship between organizations and their environment, and organizational socialization and career patterns, and gender and race or ethnic differences in organizational patterns. 3 lectures. Prerequisite: One course in sociology or consent of instructor.

SOC 402 Crime and Delinquency (3)

Criminal and delinquent behavior, by age, sex, social class, race and ethnicity of offenders and victims. Specific crime patterns including murder, assault, robbery, burglary, sex crimes, substance abuse, white collar and organized crime. Biological, psychological, sociological and other theories of crime causation. 3 lectures. Prerequisite: Junior standing.

SOC 412 Criminal Justice (3)

Approaches to the control and rehabilitation of adult and juvenile offenders; philosophy of prevention and treatment strategies, with attention to factors of race and ethnicity; history and issues concerning police, the courts, prisons, probation, parole and community-based correction. 3 lectures. Prerequisite: SOC 402.

SOC 413 Methods of Social Work (3)

Theories, concepts, values stressed in social work. Social casework. Principles and practices used by social workers serving individuals and families in correctional, public assistance, medical, psychiatric youth services, and other settings. Discussion of case material and available literature. 3 seminars. Prerequisite: SOC 302.

SOC 421 Social Theory (3)

Concepts and theories in sociology, anthropology and geography. Modern and classical perspectives. Usefulness of theories for understanding present social problems. 3 lectures. Prerequisite: Two sociology courses or consent of instructor.

SOC 431 Population Problems (3)

Analysis of world population trends using the basic demographic processes of fertility, mortality and migration. Includes the effects of population growth on food supply, pollution, energy resources and the economy. 3 lectures. Prerequisite: One sociology course and STAT 211 or consent of instructor.

SOC 470 Selected Advanced Topics in Sociology (1-3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

SOCS—SOCIAL SCIENCES

SOCS 200 Special Problems for Undergraduates (1-3)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 3 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

SOCS 366 Research and Writing Seminar in Social Sciences (3)

Development of research and bibliographic skills in the process of composing a major research paper in Social Sciences. Thesis formation, development or organizational and analytic skills, and utilization of social science data and formats. 3 seminars. Prerequisite: ENGL 215 or ENGL 218 or consent of instructor.

SOCS 400 Special Problems for Advanced Undergraduates (1-3)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 6 units, with a maximum of 3 units per quarter. Prerequisite: Consent of department head.

SOCS 424 Organizing and Teaching Social Sciences (3)

Organization, selection, presentation, application, and interpretation of social sciences subject matter for teaching at the secondary level. 3 lectures. Prerequisite: Senior standing and/or consent of instructor.

SOCS 440 Internship (3-6)

Supervised training, research, and work in public and private organizations. Total credit limited to 18 units. Prerequisite: Senior standing and/or consent of instructor.

SOCS 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: SOCS 366, senior standing or consent of instructor.

SOCS 463 Undergraduate Seminar (3)

Intensive study of selected social problems with application of techniques for analysis. 3 seminars. Prerequisite: Senior standing or consent of instructor.

SOCS 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

SOCS 487 Cooperative Education Experience (6)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Prerequisite: Sophomore standing and consent of instructor.

SOCS 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

SOCS 497 Cooperative Education Experience (12)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Prerequisite: Sophomore standing and consent of instructor.

SPAN-SPANISH**SPAN 101, 102, 103 Elementary Spanish (4) (4) (4)**

For beginners. Class practice and assigned outside work in pronunciation, sentence structure, reading, writing, and basic conversation using the communicative approach. Laboratory drill required. Language taught in its cultural context. Credit not available for students who have completed SPAN 104. To be taken in numerical sequence. 3 lectures, 1 activity.

SPAN 104 Intensive Elementary Spanish (12)

Class practice in pronunciation, syntax, reading, writing, and conversation. Offered in summer only. Not open to students with credit in SPAN 101, 102, 103. Laboratory drill required. 9 lectures, 3 activities.

SPAN 111, 112, 113 Elementary Hispanic Language and Culture (4) (4) (4)

Inductive Spanish grammar with special focus on vocabulary and culture from American agribusiness and the Hispanic cultures of the United States and Latin America. Open to all students with little or no knowledge of Spanish. 3 lectures, 1 activity. To be taken in numerical sequence.

SPAN 201, 202 Intermediate Spanish (4) (4)

Review of Spanish grammar and practice in writing and oral expression within a cultural context. 3 lectures, 1 activity. Prerequisite: SPAN 103 or consent of instructor.

SPAN 204 Intensive Intermediate Spanish (8)

Review of grammar and practice in written and oral expression based on social and cultural values. 6 lectures, 2 activities. Prerequisite: SPAN 103 or SPAN 104 or permission of instructor.

SPAN 233 Critical Reading in Hispanic Literature (4)**GEB C.1.**

Selected readings from major Hispanic authors that show the Hispanic literary tradition from the Middle Ages to the present in both Spain and Latin America. 4 lectures. Prerequisite: SPAN 202 or equivalent.

SPAN 301 Advanced Spanish Composition and Grammar (4)

Oral and written development of structural grammar, syntax, and complex components of Spanish. Vocabulary expansion and idiomatic construction. Written composition. Translations to examine linguistic and semantic differences. 4 lectures. Prerequisite: SPAN 202, or equivalent.

SPAN 303 Hispanic Culture (3)

Aspects of cultures of the Spanish-speaking peoples. History, society, political movements, art, music, and literature are discussed. Topic of instruction varies to provide specific focus. 3 lectures. Prerequisite: SPAN 202, equivalent, or consent of instructor.

SPAN 305 Significant Writers in Spanish (4)**GEB C.3.**

Critical analysis and oral discussion of poetry, essays, novels and plays by selected Hispanic writers. *Class Schedule* will list topic selected. Total credit limited to 12 units. 4 lectures. Prerequisite: SPAN 233 or equivalent.

SPAN 330 Spanish for Bilingual Speakers (4)

For students with a high degree of oral proficiency in Spanish. Review of Spanish grammar and practice in written expression. Social and cultural realities of Chicanos in the United States. 3 lectures, 1 activity. Prerequisite: SPAN 202 or consent of instructor.

SPAN 340 Chicano/a Authors (4)**GEB C.3.**

Introduction to Chicano/a literary accomplishments to facilitate appreciation of Chicano/a literary aesthetics and increase understanding of Chicano/a cultural values and lifestyles. 4 lectures. Prerequisite: SPAN 233 or equivalent.

SPAN 405 Hispanic Literature in English Translation (4)**GEB C.3.**

Selected works to be read by students in the original or in English translation. Critical analysis, interpretation, and

comparison of individual works by outstanding Hispanic writers. Lecture in English. *Class Schedule* will list topics selected. Total credit limited to 8 units. 4 lectures. Prerequisite: One literature course or consent of instructor.

SPAN 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 8 units. 1 to 4 lectures. Prerequisite: Consent of instructor.

SPC–SPEECH COMMUNICATION

SPC 101 Introduction to Speech Communication (1) (CR/NC)

Theory and practice of interpersonal, group, organizational and public communication. Fundamentals of scholarship; professional and trade journals in the discipline. No final exam. Credit/No Credit grading only. 1 lecture.

SPC 125 Critical Thinking (3) (Also listed as ENGL 125 and PHIL 125) GEB A.2.

Nature of critical thinking. Analysis of inductive and deductive arguments. Practice in the criticism and composing of arguments in English. 3 lectures. Prerequisite: ENGL 114.

SPC 201 Public Speaking (3) GEB A.3.

Introduction to the principles and types of public speaking. Practical experience in the development, presentation, and critical analysis of speeches to inform, to persuade, and to actuate. Not open to students with credit in SPC 202. 3 lectures. Prerequisite: ENGL 125 or PHIL 125 or SPC 125.

SPC 202 Principles of Speech Communication (3) GEB A.3.

Introduction to the fundamentals and principles which underlie effective speech communication. Practical experience in various types of speaking situations: informative speaking, persuasive speaking, and panel discussion. Not open to students with credit in SPC 201. 3 lectures. Prerequisite: ENGL 125 or PHIL 125 or SPC 125.

SPC 212 Interpersonal Communication (4) (Also listed as PSY 212)

Introduction to the interaction process in two-person (dyadic) communication settings. Emphasis on the functions of varying messages in the initiation, development, maintenance and termination of personal relationships. 4 lectures. Prerequisite: SPC 201 or SPC 202.

SPC 213 Organizational Communication (4)

Introduction to communication within the organization and between the organization and its environment. Effects of networks, superior/subordinate message patterns, team building, climate, message flow patterns and distortion on organizational effectiveness. 4 lectures. Prerequisite: SPC 201 or SPC 202.

SPC 217 Small Group Communication (4)

Basic principles and techniques of small group communication. Survey of the importance of discussion in contemporary society, including study of and practice in informal group discussion, panel discussion, symposium, and forum. 4 lectures. Prerequisite: SPC 201 or SPC 202.

SPC 250 Forensic Activity (1)

Lower division participation in intercollegiate forensic activities. Any student who wishes to receive academic credit for participation in such activities during the quarter should enroll. Specific assignments will be determined by instructor. Total credit limited to 6 units. 1 activity. Prerequisite: SPC 201 or SPC 202.

SPC 300 Voice and Phonetics (4)

Physiology of normal speech. The basis of speech sounds in American English, their development, symbolization and production using International Phonetic Alphabet. Assessment and improvement of student's vocal and articulation practices to enhance oral skills. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

SPC 301 Business and Professional Communication (4)

Communication skills and functions for all levels of organizational employees. Interviewing, oral briefings, motivational and conference speaking. 4 lectures. Prerequisite: SPC 201 or SPC 202.

SPC 302 Introduction to Communicative Disorders (4)

Survey of speech, language, and hearing disorders emphasizing causes, symptoms, and treatment. Role of the speech therapist in the community and in public schools. Role of the classroom teacher in speech improvement. 4 lectures. Prerequisite: SPC 201 or SPC 202.

SPC 303 Development of Speech and Language (3)

Development of speech and language from birth to adolescence. Physical and psychological processes contributing to the emergence, practice, and mastery of speech and language. 3 lectures. Prerequisite: SPC 300, SPC 302.

SPC 305 Performance of Literature (4)

Poetry, prose, nonfiction and dramatic literature performed to communicate the levels of meaning within each work to the audience. 4 lectures. Prerequisite: SPC 201 or SPC 202, 3 units of literature.

SPC 310 Storytelling: The Oral Tradition (4)

Resources and techniques to perform oral literature in primary and secondary classrooms. Focus on stories with genesis in the oral tradition. Analytical and performance components of art of storytelling are stressed equally. Topics covered include function of storytelling, techniques, audience analysis, story memory. 4 lectures. Prerequisite: SPC 201 or SPC 202.

SPC 312 Communication Theory (4)

Concepts and theories of the human communication process from a social science perspective. 4 lectures. Prerequisite: PSY 201 or PSY 202, SPC 212.

SPC 316 Intercultural Communication (4)

Examination and clarification of cultural aspects and communication problems within and between ethnic groups. 4 lectures. Prerequisite: SPC 201 or SPC 202.

SPC 320 Nonverbal Communication (4) (Also listed as PSY 320)

Influence of kinesic, proxemic, artifactual, olfactory, paralinguistic and environmental factors in human communication. Theory, research and practice in nonverbal communication. 4 lectures. Prerequisite: SPC 212.

SPC 321 Intermediate Public Speaking (4)

Further consideration of the principles of public address. Advanced practice in manuscript, extemporaneous, and impromptu speaking. 4 lectures. Prerequisite: SPC 201 or SPC 202.

SPC 322 Persuasion (4)

Persuasive theory including methods of attention, suggestion, motivation, and adaptation employed to influence feelings, attitude, change and action. Critical analysis of persuasive discourse. 4 lectures. Prerequisite: SPC 201 or SPC 202.

SPC 325 Argumentation (4)

Techniques of argumentation, logic and reasoning. Fallacies of reasoning. Experience in and analysis of various forms of formal argument, and evaluation systems. 4 lectures. Prerequisite: SPC 201 or SPC 202.

SPC 330 Classical Rhetorical Theory (4) GEB C.3.

Early development of rhetorical theory in Greco-Roman civilization. Analysis of the canons of rhetoric. Rhetorical thought of Sophists, Isocrates, Plato, Aristotle, Cicero and Quintilian. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

SPC 331 Political Advocacy and Contemporary Rhetoric (4)

Rhetoric's role in contemporary culture. Issues: political advocacy; science, technology and mass persuasion; ethics and rhetoric. Representative theorists: Burke, Weaver, Richards, Toulmin and McLuhan. 4 lectures. Prerequisite: ENGL 215 or ENGL 218.

SPC 350 Advanced Forensic Activity (2)

Upper division participation in intercollegiate forensics. Administration and operation of tournaments held annually on campus and in the community. Total credit limited to 6 units. 2 activities. Prerequisite: SPC 250.

SPC 370 Gender and Communication (4)

Examination of gender in a variety of communication contexts. Concepts presented will help students understand the theory and practice of communication with members of the same and opposite sex. 4 lectures. Prerequisite: SPC 201/202.

SPC 380 Media Effects (4)

Effects of media on the individual. Influence of mediated message producers, production technologies, and message content. Empirical approaches to data collection using experimental and survey techniques. 4 lectures. Prerequisite: SPC 201 or SPC 202.

SPC 385 Mass Media Criticism (4) (Also listed as ENGL 385 and JOUR 385)

Examines mass media (especially broadcasting) from a rhetorical/critical perspective. Aims to expand students' understanding of media issues, media's role as critic, and the

role of criticism. 4 lectures. Prerequisite: SPC 201 or SPC 202.

SPC 400 Special Problems for Advanced Undergraduates (1-2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of instructor, junior standing.

SPC 405 Group Performance of Literature (4)

Examination and experience in the various modes of group performance of literature. Readers Theatre, Chamber Theatre, Story Theatre. Scripting, directing, performing and critiquing of group performance of literature. 4 lectures. Prerequisite: SPC 305 or SPC 310, junior standing.

SPC 411 Communication Research (4)

Exploration of communication research strategies and methodologies. Basic methods of designing research in empirical communication studies. 4 lectures. Prerequisite: STAT 211 and SPC 312, junior standing. For majors only.

SPC 413 Advanced Organizational Communication (4)

Describing and measuring the organization's human message system. Planning and implementing communication training and development for the organization. New functions, careers and opportunities for the communication professional. 4 lectures. Prerequisites: Junior standing, SPC 213 and SPC 301.

SPC 424 Classroom Communication (4)

Exploration of classroom communication development. Student-teacher-parent interaction. Communication style, environmental stimuli, dialectal differences and bilingualism, measurement of communication competence. 4 lectures. Prerequisite: Junior standing, ENGL 215 or ENGL 218.

SPC 430 Rhetorical Criticism (4)

Theory and method used in the analysis and evaluation of rhetorical discourse. Study of critical essays. Practice in interpreting and evaluating persuasive discourse. 4 lectures. Prerequisite: Junior standing, SPC 330.

SPC 435 Great Speeches (4)

Selected speakers and speeches from the Greco-Roman era to the present. Analysis and discussion of oratory's role in the shaping of historical events and the development of civilization. 4 lectures. Prerequisite: Junior standing, SPC 330.

SPC 450 Internship: Speech Communication (2-4) (CR/NC)

Supervised practicum and application of principles and theories of communication in organizational settings. Total credit limited to 8 units. Credit/No Credit grading only. Prerequisite: Junior standing, 2.5 GPA, and consent of instructor.

SPC 460 Undergraduate Seminar (1)

Discussion and design of individual projects, oral reports on material in current professional writings. 1 seminar. Prerequisite: Junior standing. For majors only.

SPC 461 Senior Project (3)

Completion of approved project under faculty supervision. Project results are presented in a formal written report. Minimum 90 hours total time. Prerequisite: SPC 460. For majors only.

SPC 470 Selected Advanced Topics (1–4)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 8 units. 1–4 lectures. Prerequisite: Junior standing, ENGL 215 or ENGL 218.

SS–SOIL SCIENCE**SS 110 Orientation in Soil Science (1) (CR/NC)**

Understanding the depth and breadth of soils as a science. Examine potential career opportunities. Introduction to both student and professional organizations. Credit/No Credit grading only. 1 activity.

SS 121 Introductory Soil Science (4) GEB F.2.

Biological, chemical, physical and genetic soil properties. Interpretation of soils information for agricultural management and production. Proper land use and conservation, soil and water management. 3 lectures, 1 laboratory.

SS 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

SS 202 Soil and Water Conservation (3)

Climate, topography, soils and land use in relation to soil and water losses. Evaluation of soil and water conservation programs and practices. Miscellaneous course fee required—see *Class Schedule*. 3 lectures. Prerequisite: SS 121 or consent of instructor.

SS 221 Fertilizers and Plant Nutrition (4)

Plant nutrient requirements. Composition, value, and use of fertilizer materials, conditioners and agricultural minerals. Methods of manufacturing, distributing, and applying fertilizers. 3 lectures, 1 laboratory. Prerequisite: SS 121.

SS 223 Rocks and Minerals (4)

Origin, composition, identification and weathering of rocks, minerals, and clays important in the development of soils. Parent materials as related to the nature and properties of soils. 3 lectures, 1 laboratory. Prerequisite: SS 121, CHEM 122 or CHEM 128.

SS 300 Enterprise Project (2–4) (CR/NC)

Soil, water, and plant testing for fertilizer recommendations and general diagnostic work. Project participation is voluntary and subject to approval by the enterprise project adviser and the Cal Poly Foundation. Degree credit limited to 12 units. Credit/No Credit grading only. Prerequisite: CHEM 127, SS 221.

SS 310 Urban Soils (3)

Manipulation, creation, and management of soils in urban environments. Measurement and interpretation of physical and chemical properties. Selection of soil materials for interior and exterior plantings. 2 lectures, 1 laboratory. Prerequisite: SS 121.

SS 312 Agricultural Climatology (3)

Influence of climate, climatic factors and the plant canopy microclimate on plant growth, and yield. Managing climatic factors for improving crop production. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 1 activity. Prerequisite: SS 121 and junior standing, or consent of instructor.

SS 321 Soil Morphology (4)

Identification of soil horizons and morphological properties. Correlation of soil physical and chemical properties with landscapes and land use. Techniques of interpretations for agriculture, forest, range and urban development. Miscellaneous course fee required—see *Class Schedule*. 2 lectures, 2 laboratories. Prerequisite: SS 121.

SS 322 Soil Fertility (4)

Investigation and evaluation of the nutrient supplying ability of soils. Conditions and transformations involved in the transfer of mineral nutrients from soils to plants. Effects of cultural treatments on soil fertility. Diagnostic techniques and data interpretation in soil and plant analysis. 3 lectures, 1 laboratory. Prerequisite: SS 221, CHEM 122 or CHEM 128.

SS 339 Soil Science Internship (1–12) (CR/NC)

Selected students will spend up to 12 weeks with an approved firm or agency engaged in work and study related to their major. A detailed written proposal and written interim and final reports required. One unit of credit may be allowed for each full week of internship. Credit/No Credit grading. Prerequisite: Consent of internship instructor.

SS 350 Computer Software Applications in Agronomy (2)

Computer software applications for soil science and agriculture including word processing, data storage and manipulation, statistical analysis of data, graphics preparation and presentations. 1 lecture, 1 laboratory. Prerequisite: AG 250 or CSC 110 or consent of instructor.

SS 400 Special Problems for Advanced Undergraduates (2–4)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

SS 422 Soil Microbiology (3)

Biochemical activities of soil organisms. Effect of soil organisms on the formation, characteristics, and productivity of soils. Methods of studying soil organisms. 2 lectures, 1 laboratory. Prerequisite: SS 221, BACT 221 or BACT 224, CHEM 328, or consent of instructor.

SS 423 Soil and Water Chemistry (4)

Chemical processes governing weathering, soil mineral formation and stability, common solubility equilibria. Use of chemical principles to explain surface chemical properties of

soils and environmental problems in water and soil chemical systems. 3 lectures. 1 laboratory. Prerequisite: SS 223, CHEM 129, CHEM 326 or CHEM 316, MATH 118 or MATH 131.

SS 431 Soil Resource Inventory (3)

Development and production of soil surveys for interpretive purposes. Use of soil taxonomy and land classification systems to evaluate land for best management practices. 1 lecture, 2 laboratories. Prerequisite: SS 321.

SS 432 Soil Physics (4)

Fundamentals of soil physical properties. Structure, texture, water, air and temperature and their application to agricultural and engineering practices. 2 lectures, 2 laboratories. Prerequisite: SS 121, PHYS 121 or PHYS 131, CHEM 122 or CHEM 128, MATH 118 or MATH 131, or consent of instructor.

SS 433 Land Use Planning (3)

Development of plans and practices for management of agricultural, recreational and urban land use by evaluating the soil capabilities through the use of Soil Survey Reports. 2 lectures, 1 laboratory. Prerequisite: SS 121.

SS 440 Forest and Range Soils (4)

Ecosystem approach to the chemical, biological, physical and mechanical properties of forest and range soils. Interpretation of specific research findings and their applications to management problems. Preparation of soil management reports similar to those required by various land management organizations. Overnight field trips. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: SS 121.

SS 442 Soil Vadose Zone Remediation (3)

Water movement in the vadose zone. Monitoring and predicting management effects on water quality. Strategies for selecting the best remediation. Case histories which demonstrate handling of different monitoring problems. 3 lectures. Prerequisite: CHEM 326, GEOL 201, SS 121.

SS 444 Soil Judging (2)

Morphological description of soils in the field. Taxonomic determination of classifications and interpretive properties from soil descriptions. Participation in collegiate soil judging contests. Total credit limited to 12 units. 1 lecture, 1 laboratory. Prerequisite: SS 321 or consent of instructor.

SS 453 Tropical Soils (4)

Nature and properties of soils occurring in the tropics, their origin, morphology, classification, fertility, management and conservation. Examine social implications in international agriculture. 3 lectures, 1 laboratory. Prerequisite: SS 121, CHEM 122 or CHEM 128.

SS 461 Soils Senior Project (1)

Senior project topic selection and contract development with project adviser. Statement of problems, subproblems, assumptions, objectives, hypothesis, methods of analysis and statistical design. Development of literature review and budget of time and finances. Proper format and presentation of tabular and graphic information. 1 activity. Prerequisite: MATH 118 or MATH 131, STAT 211 or STAT 321 or CRSC 411.

SS 462 Soils Senior Project (3)

Implementation of materials and methods. Collection, analysis and interpretation of data. Completion of formal written report under adviser supervision. Minimum 90 hours. Prerequisite: SS 461.

SS 463 Undergraduate Soils Seminar (2)

Review of current research, experiments, and problems related to the student's major field of interest. Preparation and presentation of reports on problems or research activities. 2 seminars.

SS 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

SS 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 laboratories. Prerequisite: Consent of instructor.

SS 501 Research Planning (3)

Problem solving and research planning for agriculture, natural resources and related sciences. Preparation of study plans which identify problems, review appropriate literature, formulate objectives, develop methods and provide for presentation and interpretation of results. 3 lectures. Prerequisite: Graduate standing or consent of instructor.

SS 508 Landscape Management for Erosion Control (3)

Techniques for the development of soil erosion control and the dispersal of surface runoff water on urban, industrial, recreational and dwelling sites. Land grading ordinances and their limitations. Miscellaneous course fee required—see *Class Schedule*. 3 lectures. Prerequisite: Introductory soils course and graduate standing, or consent of instructor.

SS 522 Advanced Soil Fertility (3)

Current research frontiers in soil fertility. Evaluating soil testing philosophy, theories and interpretation. Optimizing soil conditions for maximizing crop production. Consequences of environmental pollution, trace elements and organic amendments. Chemical reactions including solubility and chelate equilibria, adsorption phenomena, nutrient mobility, soil mineralogy and weathering. Use of foliar fertilization. Radioisotopes in soil fertility. 3 lectures. Prerequisite: SS 322, graduate standing or consent of instructor.

SS 581 Graduate Seminar in Soils (3)

Current research, experiments and problems related to soil science. Total credit limited to 3 units. 3 seminars. Prerequisite: Graduate standing or consent of instructor.

SS 582 Advanced Land Management (3)

Development of plans and practices for the management of crop, range, and wood land. 2 seminars, 1 laboratory. Prerequisite: Graduate standing, SS 433.

SS 599 Thesis (1–6)

Individual research in soil science under faculty supervision, leading to a scholarly written presentation exhibiting originality, clarity, critical and independent thinking, proper analysis of data, appropriate organization and format, and accurate and thorough documentation. Six units required for the M.S. degree. Prerequisite: Graduate standing and consent of instructor.

STAT–STATISTICS**STAT 130 Introduction to Statistical Reasoning (3)****GEB B.2.**

Survey of statistical ideas and philosophy. Emphasis on concepts rather than in-depth coverage of statistical methods. Topics include sampling, experimentation, data exploration, chance phenomena, and methods of statistical inference. Credit not allowed for students with previous Statistics course. 3 lectures. Prerequisite: Intermediate algebra, appropriate score on ELM.

STAT 200 Special Problems for Undergraduates (1–2)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

STAT 211 Elementary Probability and Statistics (3)**GEB B.2.**

Classification of statistical data. Calculation and uses of various averages, measures of variability, elementary probability. Binomial and normal distributions. Random sampling, confidence intervals. Introduction to hypothesis testing. 3 lectures. Prerequisite: Intermediate algebra, appropriate score on ELM.

STAT 212 Statistical Methods (3)**GEB B.2.**

Tests of hypotheses, and confidence intervals on common parameters. Linear regression and correlation, multiple regression. Analysis of variance and enumerative data. Nonparametric methods. 3 lectures. Prerequisite: STAT 211.

STAT 217 Statistical Methods (4)**GEB B.2.**

Sampling and experimentation, descriptive statistics, confidence intervals, two-sample hypothesis tests for means and proportions, Chi-square tests, linear and multiple regression, analysis of variance. 4 lectures. Prerequisite: Intermediate algebra, appropriate score on ELM.

STAT 251 Statistical Inference for Management I (4)**GEB B.2.**

Descriptive statistics. Probability distributions. Point and interval estimation of common population parameters. Hypothesis tests of population means, proportions, and variances. Chi-square analysis. Nonparametric tests. Survey sampling. 4 lectures. Prerequisite: MATH 124.

STAT 252 Statistical Inference for Management II (4)**GEB B.2.**

Regression, correlation, multiple regression, time series, and forecasting. Single factor analysis of variance. Statistical quality control. Experience with statistical computer packages in analyzing data sets. Use of computers assumed

throughout course. 4 lectures. Prerequisite: STAT 251 and CSC 120 or one course in computer programming.

STAT 312 Statistical Methods for Engineers (3)**GEB B.2.**

Survey of statistical methods. Descriptive statistics. Graphical methods. Discrete and continuous random variables. One and two sample confidence intervals and hypothesis tests. Single factor analysis of variance. Chi-square tests. Use of computer for solving statistical problems. 3 lectures. Prerequisite: MATH 142.

STAT 313 Applied Experimental Design and Regression Models (3)**GEB B.2.**

Applications of statistics for students not majoring in statistics or mathematics. Analysis of variance including the one-way classification, randomized blocks, Latin squares, and factorial designs. Introduction to multiple regression and to analysis of covariance. Use of computer software in the solution of statistical problems. 3 lectures. Prerequisite: STAT 212.

STAT 321 Statistical Analysis I (3)**GEB B.2.**

Descriptive statistics, probability, probability distributions for discrete and continuous random variables, expected value, sampling distributions, large sample estimation procedures. 3 lectures. Prerequisite: MATH 132 or MATH 142.

STAT 322 Statistical Analysis II (4)**GEB B.2.**

Confidence intervals, hypothesis testing, one and two-factor analysis of variance, simple linear regression, nonlinear and multiple regression, chi-square tests, introduction to statistical quality control. 4 lectures. Prerequisite: STAT 321.

STAT 323 Analysis of Variance (3)**GEB B.2.**

Single and two-factor analysis of variance, multiple comparisons, fixed and random effects. Randomized complete block, balanced incomplete block and Latin square designs. Factorial and nested designs. Analysis of covariance. 3 lectures. Prerequisite: STAT 322.

STAT 324 Applied Regression Analysis (3)**GEB B.2.**

Simple linear regression, aptness of model, special topics in simple linear regression, multiple linear regression, indicator variables, selection of "best subset," and introduction to nonlinear regression models. 3 lectures. Prerequisite: STAT 212 or STAT 252 or STAT 322.

STAT 330 Statistical Uses of Computers (3)

Techniques available to the statistician for efficient use of a digital computer to perform statistical computations and to handle large amounts of data. Use of special languages. Analysis of computer software used in the solution of statistical problems. 3 lectures. Prerequisite: STAT 212 or STAT 252 or STAT 322, and one course in computer programming.

STAT 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

STAT 412 Applied Probability Models (3)

Discrete and continuous Markov chains. Poisson processes and generalizations, birth and death processes. Applications of renewal theory. Queuing models, branching processes, Markovian decision processes. 3 lectures. Prerequisite: STAT 321 and MATH 242, or consent of instructor.

STAT 415 Nonparametric Methods in Statistics (3)

Hypothesis testing when form of parent population is unknown. Tests based on Binomial Distribution. Measures of dependence. Contingency tables, tests based on ranks. Kolmogorov-Smirnov-type tests. 3 lectures. Prerequisite: STAT 212 or STAT 322.

STAT 416 Statistical Analysis of Time Series (3)

Descriptive smoothing methods, regression models for time series data, forecasting via exponential smoothing, methods for seasonal data, ARIMA models and Box-Jenkins methods, frequency domain analysis, filtering. 3 lectures. Prerequisite: STAT 252 or STAT 322.

STAT 418 Analysis of Cross-Classified Data (3)

Discrete multivariate statistics, including analysis of cross-classified data, log-linear models for multidimensional contingency tables, goodness of fit statistics, measures of association, model selection, and hypothesis testing. 3 lectures. Prerequisite: Two courses in statistics and MATH 206 or consent of instructor.

STAT 419 Applied Multivariate Statistics (3)

Continuous multivariate statistics. Multivariate linear model, principal components and factor analysis, discriminant analysis, clustering, and canonical correlation. 3 lectures. Prerequisite: Two courses in statistics and MATH 206 or consent of instructor.

STAT 421 Sampling Techniques (3)

Planning, execution, and analysis of sampling from finite populations. Sampling designs and estimation procedures. Nonsampling errors. Questionnaire analysis. Case studies. 3 lectures. Prerequisite: STAT 212, STAT 252, or STAT 322.

STAT 423 Linear Models (3)

General linear model approach to various applied methods. Estimability. Advanced topics in statistical design, including split plot, fractional factorial and repeated measures designs. Response surface methods. 3 lectures. Prerequisite: STAT 323, MATH 206.

STAT 425 Probability Theory and Applications I (3)

Basic probability theory, conditional and marginal probability, stochastic independence, probability models for random phenomena, probability distributions, mathematical expectation and transformations. 3 lectures. Prerequisite: STAT 321, MATH 241.

STAT 426 Probability Theory and Applications II (3)

Multivariate normal distribution, sampling distributions, theory of estimation and hypothesis testing. 3 lectures. Prerequisite: STAT 425.

STAT 427 Mathematical Statistics (3)

Investigation of statistical theory, including the topics of Bayesian inference, regression and linear hypotheses, and sequential analyses. 3 lectures. Prerequisite: STAT 426.

STAT 430 Statistical Computing (3)

Design and use of statistical software in programming, statistical applications, efficiency and numerical accuracy of algorithms, object oriented statistical languages, random number generation, simulation, resampling, bootstrapping, linked and dynamic graphics, smoothing algorithms. 3 lectures. Prerequisite: STAT 322 and STAT 330.

STAT 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.

STAT 463 Undergraduate Seminar (2) (CR/NC)

Reports and discussions by students through seminar methods, based on topics of interest to persons preparing for a career in statistics. Offered only on a Credit/No Credit basis. 2 seminars.

STAT 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1–3 lectures. Prerequisite: Consent of instructor.

STAT 485 Cooperative Education Experience (6) (CR/NC)

Part-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

STAT 495 Cooperative Education Experience (12) (CR/NC)

Full-time work experience in business, industry, government, and other areas of student career interest. Positions are paid and usually require relocation and registration in course for two consecutive quarters. Formal report and evaluation by work supervisor required. Total credit limited to 16 units. Credit/No Credit grading only. Prerequisite: Sophomore standing and consent of instructor.

STAT 512 Statistical Methods (4)

Statistical methods in research for graduate students not majoring in mathematical sciences. Probability distributions, confidence intervals, hypothesis testing, contingency tables, linear regression and correlation, multiple regression, analysis of variance. Use of computer packages. 4 seminars. Prerequisite: Intermediate algebra or equivalent.

TH–THEATRE**TH 210 Introduction to Theatre (3)****GEB C.2.**

Play production process and approach to the theatre including theatrical terminology, methods, dramatic literature, aesthetics and technology. 3 lectures.

TH 327, 328 Theatre History and Literature (3) (3)**GEB C.3.**

History of theatre in the Western world and representative plays from the Greeks through the French Seventeenth

Century, and from Eighteenth Century England to the present. 3 lectures. Prerequisite: TH 210 or consent of instructor.

TH 330 Stagecraft (3)

Sound, costume construction, stage lighting, make-up, and construction and painting of stage scenery. Total credit limited to 9 units. Prerequisite: Consent of instructor.

TH 340 Acting (3)

Basic acting techniques, improvisation, characterization, pantomime and movement. 2 lectures, 1 activity. Prerequisite: Consent of instructor.

TH 342 Directing (3)

Script analysis, motivation and blocking of action, preparation of the prompt book. Direction of one-act plays. 1 lecture, 2 activities. Prerequisite: Junior standing and consent of instructor.

TH 345 Rehearsal and Performance (3)

Preparation of a play for public presentation, including acting, stage management, publicity and house management. Admission to course by audition only. Total credit limited to 9 units. 3 laboratories.

TH 350 Advanced Playwriting (3)

Examines dramatic structure, techniques of dialogue, and means of characterization in variety of plays. Relates dramatic writing to technical, design, directorial and acting demands. Composition of monologues, scenes and one-act play; works read and critiqued in class. 3 seminars. Prerequisite: TH 210, ENGL 114 and ENGL 215 or ENGL 218.

TH 380 Children's Drama (3)

Role-playing, group dramatization, and related activities. For students preparing to teach. 1 seminar, 2 activities. Prerequisite: Any GEB Area C.2 or C.3 course and sophomore standing.

TH 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research, or project centering around theatre. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: Consent of department head.

TH 430 Introduction to Stage Design: Scenery (3)

Theories and contemporary practices in stage scenic design. Script analysis and production concept through shop plans, renderings and models, property plots. Drafting and design projects. 1 seminar, 2 activities. Prerequisite: Consent of instructor.

TH 432 Introduction to Stage Design: Costume (3)

Adapting historic and contemporary fashion for the stage. Script analysis for costume detail. Contemporary professional practices. Design projects. 1 seminar, 2 activities. Prerequisite: Consent of instructor.

TH 434 Introduction to Stage Design: Lighting and Sound (3)

Lighting and sound design for the stage, dance concerts and exhibitions. From script analysis, exhibition proposal, through the rendering of production lighting and sound plots.

Light and color. Contemporary instrumentation and controls. Production analysis. Practical execution in performance situations. 1 seminar, 2 activities. Prerequisite: Consent of instructor.

TH 470 Selected Advanced Topics (1–3)

Directed group study of selected topics for advanced students. Open to undergraduate and graduate students. *Class Schedule* will list topic selected. Total credit limited to 6 units. 1 to 3 lectures. Prerequisite: Consent of instructor.

TH 471 Selected Advanced Laboratory (1–3)

Directed group laboratory study of selected topics for theatre students. *Class Schedule* will list topics selected. Total credit limited to 6 units. 1–3 laboratories. Prerequisite: Consent of instructor.

VGSC–VEGETABLE SCIENCE

VGSC 202 Enterprise Project (1–4) (CR/NC)

Beginning field experience in production and marketing of a vegetable crop, under faculty supervision. Project participation is subject to approval by the department head and the Cal Poly Foundation. Degree credit limited to 4 units. Credit/No Credit grading only. Prerequisite: CRSC 201, or consent of instructor.

VGSC 230 Introduction to Vegetable Science (4) GEB F.2.

Environmental and cultural principles involved in the production of California vegetable crops; temperature, daylength and fertility effects on production and yield, use of plastic mulches and row covers, use of transplants, and pests and diseases affecting vegetables. Harvest principles, precooling methods and packaging. Survey of vegetable production for other than crop science majors. Miscellaneous course fee required—see *Class Schedule*. 3 lectures, 1 laboratory.

VGSC 232 California Vegetable Production (4)

History, botany, growth characteristics and climatic adaptation, pests, and harvesting methods for the most important vegetable crops grown in California. Use of transplants, plastic mulches and row covers in vegetable production. Current topics in agriculture important to the vegetable industry. Field trip to a major California vegetable production area required. Survey of vegetable production for crop science majors. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: CRSC 133.

VGSC 250 Vegetable Science for the Urban Gardener (3)

Seedbed preparation, mulching, composting, manures and fertilizers, transplanting, seeding, irrigation and pest control in an urban garden. Merits of organic, low-input and conventional vegetable production, including organic methods of pest control. Instructional plots may be grown completely organically. Miscellaneous course fee may be required—see *Class Schedule*. 2 lectures, 1 laboratory.

VGSC 402 Enterprise Project (1–4) (CR/NC)

Advanced experience in the production of vegetable crops. Development of a plan for field operations, a marketing plan, and a budget. Management decision-making. Project participation is subject to approval by the department head

and the Cal Poly Foundation. Degree credit limited to 4 units. Credit/No Credit grading only. Prerequisite: VGSC 202, and consent of instructor.

VGSC 421 Postharvest Technology of Horticultural Crops (4) (Also listed as FRSC 421)

Respiration, respiratory constituents, ripening, and chilling injury; harvesting methods and procedures; current handling and packaging techniques; precooling and refrigeration; modified and controlled atmosphere storage; relative humidity; and transportation of horticultural crops. Field trip to major California production areas required plus local grower visits. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: One production class in either fruits, vegetables or ornamentals, or consent of instructor.

VGSC 423 Advanced Vegetable Science (4)

Studies of production systems utilizing the most advanced cultural practices including integrated management of all inputs and pests. Field trip to desert vegetable production regions required. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: VGSC 232.

VGSC 424 Vegetable Crop Management (4)

Vegetable production systems from an organizational viewpoint. Management, organization and general commercial operations, including planning, budgeting, and managing personnel. Field trip to a major California vegetable production area required. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: VGSC 232 or consent of instructor.

VGSC 521 Advanced Crop Production (4) (Also listed as CRSC 521)

Production and management of crops under intensive and extensive cultural systems and low-input agriculture. Interaction between growth factors at various levels of production and interaction of cultural practices and plant requirements. Miscellaneous course fee may be required—see *Class Schedule*. 3 lectures, 1 laboratory. Prerequisite: Graduate standing and consent of instructor.

VS—VETERINARY SCIENCE

VS 123 Anatomy and Physiology (3)

Structural aspects and the normal functions of the principal systems of the various farm animals. 2 lectures, 1 laboratory. Prerequisite: ZOO 131.

VS 200 Special Problems for Undergraduates (2–3)

Individual investigation, research, studies or surveys of selected problems. Total credit limited to 4 units, with a maximum of 3 units per quarter. Prerequisite: Consent of department head.

VS 203 Animal Parasitology (3)

Identification, life cycles, prevention and control of the common external and internal parasites causing economic loss in livestock. 3 lectures. Prerequisite: ZOO 131.

VS 312 Production Medicine (3)

Basic disease concepts. Fundamentals of immunology and therapeutics. Disease prevention principles, infectious and non-infectious. Pre-harvest food safety and milk and meat quality assurance. Herd health management programs for production efficiency and product quality. 3 lectures. Prerequisite: ASCI 141, ASCI 142, ASCI 143 and ASCI 144.

VS 400 Special Problems for Advanced Undergraduates (2–4)

Individual investigation, research, studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 4 units per quarter. Prerequisite: Consent of department head.

VS 438 Systemic Animal Physiology (4)

Homeostatic relationships of organ systems. Cardiovascular, respiratory, urogenital and neuro-endocrinological functions. 3 lectures, 1 laboratory. Prerequisite: VS 123, CHEM 328.

WS—WOMEN'S STUDIES

WS 301 Introduction to Women's Studies (3)

Introduction to women's contributions to various areas of human life and to women's place in history and society. Students will increase their understanding of women as a principal category of scholarly investigation. 3 lectures. Prerequisite: ENGL 114, ENGL 125 or PHIL 125 or SPC 125, upper division standing.

WS 400 Special Problems for Advanced Undergraduates (1–2)

Individual investigation, research studies, or surveys of selected problems. Total credit limited to 4 units, with a maximum of 2 units per quarter. Prerequisite: WS 301; WS 401 or WS 411 or HIST 434 or HIST 435 or PSY 314; and consent of Women's Studies director.

WS 401 Seminar in Women's Studies (3)

Opportunity to explore scholarly works on women's contributions to various areas of human life. Discussion and reports on library research will be incorporated into the course. Field research or service is required. 3 seminars. Prerequisite: WS 301, upper division standing.

WS 411 Women, Race and Class (3) GEB D.4.b.

Interactive roles of ethnicity, gender and class on the lives of individual women, and society as a whole. Examination of social conditions faced by different groups of contemporary women and the diverse ethnic and class heritages with which they shape their lives. 3 lectures. Prerequisite: WS 301, one course in SOC or WS, upper division standing.

ZOO—ZOOLOGY

ZOO 131 General Zoology (4) GEB B.1.b.

Cells, tissues, and organ systems of vertebrates. Emphasis on man and domestic animals. 2 lectures, 2 laboratories.

ZOO 237 Human Anatomy (3)

Structure of the human body as the basis of function. Supplemented with demonstrations of human cadavers. Not open for Anatomy and Physiology Concentration credit to

students who have completed ZOO 326. 2 lectures, 1 laboratory. Prerequisite: ZOO 131 or BIO 153.

ZOO 238, 239 Human Physiology I, II (3) (3) GEB B.1.b.

Function of various human organ systems with appropriate laboratory experiments. Credit not allowed for students in the Anatomy and Physiology Concentration who have completed ZOO 432 or ZOO 433. 2 lectures, 1 laboratory. Prerequisite for ZOO 238: ZOO 237 and CHEM 121 or CHEM 124 or CHEM 127. Prerequisite for ZOO 239: ZOO 238.

ZOO 321 Mammalogy (4) GEB B.1.b.

Biology and economic importance of mammals. Classification and identification of mammals, with emphasis on California species. 2 lectures, 2 laboratories. Prerequisite: BIO 153.

ZOO 322 Ichthyology (4) GEB B.1.b.

Phylogeny, anatomy, functional morphology, physiology, and ecology of marine and freshwater fishes. Special reference to local and economically important species. Laboratory emphasis on taxonomy of California species, especially marine groups. 2 lectures, 2 laboratories. Prerequisite: BIO 153.

ZOO 323 Ornithology (4) GEB B.1.b.

Classification and identification of birds, with emphasis on California species. Anatomy, physiology, ecology and behavior. Saturday field trips required. 2 lectures, 2 laboratories. Prerequisite: BIO 153.

ZOO 324 Zoo Biology (3) GEB B.1.b.

Wild animals in captivity. Principles and problems of maintaining them for recreational, educational and scientific purposes. 3 lectures. Prerequisite: One course in biology or zoology.

ZOO 326 Comparative Anatomy of the Chordates (5) GEB B.1.b.

Comparative structure of chordate organ systems. Laboratory emphasis on dissection techniques. 3 lectures, 2 laboratories. Prerequisite: BIO 153.

ZOO 329 Vertebrate Field Zoology (4) GEB B.1.b.

Identification and natural history of terrestrial vertebrates, with emphasis on field studies and local species. 2 lectures, 2 laboratories. Prerequisite: BIO 153.

ZOO 335 General Entomology (4)

Introduction to the study of insects. Structure, major orders and families of insects, life histories, medical and economic importance. Insect collection required. 2 lectures, 2 laboratories.

ZOO 336 Invertebrate Zoology (4) GEB B.1.b.

Invertebrate groups of animals with emphasis on taxonomy, morphology, distribution and economic importance. 2 lectures, 2 laboratories, and fieldwork. Prerequisite: BIO 153 or consent of instructor.

ZOO 340 Human Muscle Anatomy (2)

Muscles of a human cadaver. 1 lecture, 1 laboratory. Prerequisite or concurrent: ZOO 237.

ZOO 341 Herpetology (4) GEB B.1.b.

Living and extinct reptiles and amphibians; an adaptive approach to their diversity, biology, and classification. 2 lectures, 2 laboratories. Prerequisite: BIO 153.

ZOO 356 Neurobiology (3) GEB B.1.b.

Survey of the nervous system with emphasis on functional anatomy of the human brain. Motor and sensory systems. Neural control mechanisms, including neurotransmitters and neuromodulators. Development, aging, and common disorders. 3 lectures. Prerequisite: BIO 153.

ZOO 405 Vertebrate Development (5)

Events and mechanisms of embryonic development, including fertilization, morphogenesis, cell differentiation, and organogenesis, with emphasis on vertebrates. 3 lectures, 2 laboratories. Prerequisite: BIO 153 and BIO 303.

ZOO 421 Immature Stages of Insects (4)

Identification, biology, and economic importance of preimaginal insect forms. 2 lectures, 2 laboratories. Prerequisite: ZOO 335 or consent of instructor.

ZOO 422 Functional Histology (4)

Functional microscopic anatomy of principal tissues and organs of vertebrates. Structural studies to determine mechanisms underlying physiological processes. 2 lectures, 2 laboratories. Prerequisite: BIO 153.

ZOO 425 Parasitology (4)

External and internal parasites of man and animals. Life history. Parasite-host relationships. Control and recognition of species of clinical importance. 2 lectures, 2 laboratories. Prerequisite: BIO 153 and BACT 221 or BACT 226.

ZOO 426 Serology and Immunology (4)

Nature of beneficial and harmful immune reactions. Theory and techniques of serological methods in diagnosing disease. Designed for preparing laboratory technologists. 2 lectures, 2 laboratories. Prerequisite: Consent of instructor.

ZOO 428 Hematology (4)

Formation, composition, function and destruction of blood in health and disease. Methods for examination of blood. Designed for preparing laboratory technologists. 2 lectures, 2 laboratories. Prerequisite: BIO 153 or ZOO 131, and consent of instructor. Recommended: ZOO 426.

ZOO 432 Physiology II: Comparative Systems (4)

Physiological mechanisms involved in osmotic and ionic regulations, digestion, circulation, respiratory energetics and thermal acclimation. Laboratory experiments in physiological processes and their ecological importance. 2 lectures, 2 laboratories. Prerequisite: BIO 431.

ZOO 433 Physiology III: Endocrine and Reproductive (4)

Introduction to the endocrine and reproductive systems of vertebrate animals. Includes not only classical actions of hormones but also mechanisms of hormone action, relationship between nervous and endocrine systems, hormone bioassay, and selected clinical aspects of endocrinology. 3 lectures, 1 laboratory. Prerequisite: BIO 431.

ZOO 436 Functional Invertebrate Zoology (4)

Comparative study of the functions of organ systems of the invertebrate groups of organisms. Emphasis on strategies utilized in accomplishing the function of the organ systems in adapting to different environmental demands. 2 lectures, 2 laboratories. Prerequisite: ZOO 336 or consent of instructor.

ZOO 437 Animal Behavior (4)

Behavioral adaptations of animals to their environment and way of life. Analysis of behavior patterns, use of patterns in clarifying evolutionary and ecological relationships. 3 lectures, 1 laboratory. Prerequisite: BIO 153. Recommended: BIO 325.

ZOO 530 Behavioral Ecology (3)

Function and evolution of behavioral phenomena as they relate to ecological phenomena. Topics include habitat selection, spacing mechanisms, reproductive strategies, feeding strategies, agonistic, parasitic, and altruistic behavior; migration, and comparative social systems. 3 seminars. Prerequisite: Graduate standing, BIO 325 or BOT 326, ZOO 437. Recommended: BIO 414.

FACULTY

and

STAFF

Directories

UNIVERSITY ADMINISTRATION

OFFICE OF THE PRESIDENT

President..... Warren J. Baker
 Presidential Aide..... Gerry K. Mueller
 Executive Assistant to the President Position Vacant
 Affirmative Action Director Anna J. McDonald

ACADEMIC AFFAIRS

Vice President for Academic Affairs Robert D. Koob
 Associate Vice President for Academic Affairs and
 University Dean Glenn W. Irvin
 Academic Program Planner..... Position Vacant
 Coordinator, Writing Skills
 Program Mary Kay Harrington
 Associate Vice President for Academic
 Resources A. Charles Crabb
 Associate Vice President for Enrollment
 Support Services Euell W. Kennedy
 Director, Admissions James L. Maraviglia
 Director, Financial Aid..... L. Diane Ryan
 Registrar/Director, Academic
 Records Thomas L. Zuur
 Dean, Extended Education and
 Faculty Development Carol E. Barnes
 Director, International Programs David J. Yang
 Dean, Library Services David B. Walch
 Associate Dean (Interim)..... Ilene F. Rockman
 Dean, Research and Graduate
 Programs Susan Opava-Stitzer
 Director, Grants Development..... Margaret Cardoza
 Director, Faculty Affairs..... Michael H. Suess
 Director, Institutional Studies Elaine Ramos Doyle
 Director, Intercollegiate Athletics John McCutcheon

COLLEGE OF AGRICULTURE..... Dean, Joseph Jen
 Associate Dean, Walter R. Mark
 Director of Outreach Services, Joseph E. Sabol
 Director of Farm Systems, Phillip M. Doub
 Agribusiness M. LeRoy Davis
 Agricultural Education Glen R. Casey
 Agricultural Engineering..... Edgar J. Carnegie
 Animal Science Phillip Doub (Interim)
 Crop Science George G. Gowgani
 Dairy Science Edwin H. Jaster
 Food Science and Nutrition Joseph Montecalvo
 Military Science Major John E. Bachmann
 Natural Resources Management Norman H. Pillsbury
 Ornamental Horticulture Stephen F. Anglely (Interim)
 Soil Science..... Terry L. Smith

COLLEGE OF ARCHITECTURE AND

ENVIRONMENTAL DESIGN Dean, Paul R. Neel
 Associate Dean, K. Richard Zweifel
 Architectural Engineering John W. Edmisten
 Architecture..... James R. Bagnall and Allan R. Cooper
 City and Regional Planning Linda C. Dalton
 Construction Management James A. Rodger
 Landscape Architecture Walter D. Bremer

COLLEGE OF BUSINESS Dean, Allen Haile
 Associate Dean, Position Vacant
 Accounting John C. Robison
 Business Administration John C. Rogers
 Economics Artemis Papakyriazis
 Industrial Technology Fred Abitia
 Management..... Abraham B. Shani

COLLEGE OF ENGINEERING Dean, Peter Y. Lee
 Associate Dean, Paul E. Rainey
 Associate Dean, Daniel W. Walsh
 Aeronautical Engineering..... Russell M. Cummings
 Civil and Environmental Engineering Edward Nowatzki
 Computer Engineering Program James Harris
 Computer Science..... James L. Beug
 Electronic and Electrical Engineering Saul Goldberg
 Industrial and Manufacturing
 Engineering H. Jo Anne Freeman
 Materials Engineering Robert H. Heidersbach
 Mechanical Engineering Ronald L. Mussulman

COLLEGE OF LIBERAL ARTS Dean, Paul J. Zingg
 Associate Dean, Harry W. Sharp, Jr.
 Interim Associate Dean, Susan Currier
 Art and Design Charles W. Jennings
 English Brent H. Keetch
 Foreign Languages and Literatures William T. Little
 Graphic Communication Harvey R. Levenson
 History Robert E. Burton
 Journalism Nishan R. Havandjian
 Liberal Studies Program..... Robert S. Cichowski
 Music Clifton E. Swanson
 Philosophy Diane P. Michelfelder
 Political Science Allen K. Settle
 Psychology and Human Development..... Patrice L. Engle
 Social Sciences..... Harold R. Kerbo
 Speech Communication Raymond F. Zeuschner
 Theatre and Dance..... Alvin J. Schnupp
 Women's Studies Program..... Carolyn Stefanco

COLLEGE OF SCIENCE AND

MATHEMATICS Dean, Philip S. Bailey
 Biological Sciences V. L. Holland
 Chemistry John C. Maxwell
 Mathematics Stephen T. Weinstein
 Physical Education and Kinesiology Dwayne G. Head
 Physics Robert H. Dickerson
 Statistics Roxy L. Peck

ETHNIC STUDIES Director, Robert F. Gish

UNIVERSITY CENTER FOR

TEACHER EDUCATION Director, Susan Roper

ADMINISTRATION AND FINANCE

Vice President, Administration and Finance. Frank T. Lebens
 Associate Vice President, Administration and
 Finance Position Vacant
 Administration and Finance Associate..... Vicki Stover
 Director, Budget Planning and
 Administration Richard R. Ramirez
 Director, Facilities Planning Robert E. Kitamura
 Director, Facilities Services Edward M. Naretto
 Director, Fiscal Services Robert Dignan
 Director, Human Resources Edna Chun
 Human Resources Manager..... Barbara Melvin
 Staff Development and Training Manager Joan Lund
 Director, Public Safety Services Joseph C. Risser
 Director, Support Services Ray Macias

INFORMATION SYSTEMS

Vice President for Information Systems .. Arthur S. Gloster, II
 Director, Academic Computing Services .. Robert C. Clover
 Director, Administrative Systems..... Position Vacant
 Director, Communication Services Norman E. Johnson
 Director, Computing Services Ken Burton

STUDENT AFFAIRS

Vice President for Student Affairs Position Vacant
 Associate Vice President, Student Affairs .. Position Vacant
 Director, Campus Student Relations/
 Judicial Affairs W. Carl Wallace
 Director, Career Services Richard M. Equinoa
 Director, Health and Psychological
 Services Kerry T. Yamada
 Test Officer George Stanton
 Director, Residential Life and Education.. Preston C. Allen
 Director, Student Academic
 Services Armando A. Pezo-Silva
 Coordinator, Academic Skills Center Patricia A. Stewart
 Coordinator, Disabled Student
 Services Harriet Clendenen
 Director, Minority Engineering Program .. David Cantu
 Director, Student Support Services Gregory Roberts
 Director, Upward Bound Samuel Cortez
 Director, Student Life and Activities.... Kenneth B. Barclay
 Coordinator, Community Services Patricia (Sam) Lutrin
 Coordinator, Greek Affairs Walter M. Lambert

UNIVERSITY RELATIONS AND DEVELOPMENT

Vice President, University Relations Position Vacant
 Executive Director, University Relations
 and Development..... Charles R. Allen
 Director, Alumni Relations..... Steven B. Shockley
 Director, Communications Darlene Slack
 Communications Officer..... C. Robert Anderson
 Publications Editor..... Ginny Monteen
 Director, Corporate and Foundation
 Relations Robert J. Carroll
 Director, Gift Planning and
 Endowments Ronald D. Nordeen
 Director, Major Gifts Susan E. Childers-Kraft

Manager, University Development
 Services Denise Mendonca

AUXILIARY ORGANIZATIONS

Associated Students, Inc.

Interim Executive Director Pauline W. Harrigan
 Director, ASI Children's Center Haila Hafley
 Director, Finance James Towles
 Director, Galerie Jeanne LaBarbera
 Director, Operations John Stipicevich
 Director, Program Management Rod Neubert
 Director, Recreational Sports Rick Johnson

Foundation

Executive Director..... Alfred W. Amaral
 Associate Executive Director Robert E. Griffin
 Director, Campus Dining Nancy Williams
 Director, El Corral Bookstore C. Court Warren
 Director, Financial Services..... Don Shemenske
 Interim Human Resources Manager Joanne Petree
 Sponsored Programs Administrator Don Prout
 Director, Vocational Education Production .. Patrick Smith

CAL POLY CHIEF EXECUTIVE OFFICERS

Cal Poly has been guided by the following chief executive officers:

Leroy Anderson	1902 to 1908
Leroy Burns Smith	1908 to 1914
Robert W. Ryder	1914 to 1921
Nicholas Ricciardi.....	1921 to 1924
Margaret Chase (acting).....	1924
Benjamin Ray Crandall	1924 to 1933
Julian A. McPhee	1933 to 1966
Dale W. Andrews (acting).....	1966 to 1967
Robert E. Kennedy	1967 to 1979
Dale W. Andrews (acting).....	1979
Warren J. Baker	1979 to

FACULTY EMERITI

(Dates indicate period of service)

Robert E. Kennedy (1940–1979)	President Emeritus
J. Phil Adams, Jr. (1970–1990)	Economics
Robert W. Adamson (1953–1983).....	Aeronautical and Mechanical Engineering
William Alexander (1958–1988).....	Political Science
John W. Algeo (1949–1954 and 1985–1992)	Animal Sciences and Industry
John K. Allen (1952–1970)	Veterinary Science
Ray R. Allen (1955–1986)	Engineering Technology
Anthony J. Amato (1955–1982)	Ornamental Horticulture
Olive M. Andersen (1957–1972)	Mathematics
Elizabeth B. Anderson (1958–1980)	English
Marshall L. Anderson (1975–1991)	Civil and Environmental Engineering
Richard A. Anderson (1947–1983).....	Physical Education
Roy E. Anderson (1949–1978)	Business

- Russell K. Anderson (1955–1991)..... Animal Sciences and Industry
- Warren R. Anderson (1946–1979)..... Electronic and Electrical Engineering
- Robert L. Andreini (1954–1983)..... Speech Communication
- Alfred E. Andreoli (1963–1990)..... Aeronautical Engineering
- James G. Andresen (1956–1992)..... Mechanical Engineering
- Dale W. Andrews (1950–1983)..... Executive Vice President
- John H. Applegarth (1952–1972)..... Biological Sciences
- William W. Armentrout (1953–1980)..... Education
- Robert F. Asbury, Jr. (1964–1988)..... Architecture
- Charles B. Atlee, Jr. (1969–1990)..... Crop Science
- James H. Babb (1959–1982)..... Graphic Communications
- Paraschos Babos (1972–1991)..... Biological Sciences
- Roger S. Bailey (1962–1979)..... Art
- Allan S. Baillie (1978–1991)..... Management
- Thomas J. Ballew (1975–1993)..... Architectural Engineering
- Stanley L. Barr (1959–1980)..... English
- George C. Beatie (1959–1980)..... Music
- Joy G. Berghell (1956–1975)..... Library
- Ellard W. Betz (1947–1976)..... Engineering Technology
- Charles R. Beymer (1966–1990)..... University Library
- Richard Birkett (1955–1988)..... Animal Science and Industry
- Chester O. Bishop (1957–1973)..... Mechanical Engineering
- Charles R. Black (1973–1989)..... Mechanical Engineering
- Emmett A. Bloom (1946–1974)..... Animal Science
- Enrico P. Bongio (1948–1979)..... Engineering Technology
- James S. Booth (1972–1988)..... Biological Sciences
- Woodford E. Bowls (1937–1973)..... Physics
- William M. Boyce (1962–1978)..... Management
- Patricia Brenner (1970–1992)..... English
- J. Philip Bromley (1947–1973)..... Agricultural Management
- Howard C. Brown (1943–1983)..... Ornamental Horticulture
- William H. Brown (1957–1992)..... Architecture
- William L. Bruckart (1969–1984)..... Industrial Technology
- Athol J. D. Brunk (1957–1980)..... Physics
- Richard A. Bucich (1963–1988)..... Electronic and Electrical Engineering
- L. LaVerne Bucy (1955–1978)..... Animal Science
- Charlotte B. Burns (1974–1992)..... Ornamental Horticulture
- Wallace Burt (1968–1986)..... Accounting
- William O. Buschman (1956–1980)..... Computer Science and Statistics
- Arthur G. Butzbach (1950–1970)..... Education
- James M. Buxbaum (1978–1992)..... Business Administration
- Edward A. Cairns (1969–1991)..... English
- Laurence H. Carr (1963–1980)..... Engineering Technology
- Marjorie Cass (1957–1974)..... Education
- Everett M. Chandler (1951–1977)..... Student Affairs
- Daniel C. Chase (1954–1979)..... Agricultural Management
- F. Stuart Chestnut (1963–1990)..... Physical Education and Recreation Administration
- Gaylord Chizek (1958–1989)..... Agricultural Management
- Thomas T. L. Chou (1961–1986)..... Electronic and Electrical Engineering
- Robert L. Cleath (1965 and 1968–1980)..... Speech Communication
- Edward Clerkin (1964–1987)..... Electronic and Electrical Engineering
- Fred L. Clogston (1960–1992)..... Biological Sciences
- Clifford B. Cloonan (1957–1990)..... Electronic and Electrical Engineering
- George Clucas (1968–1982)..... Political Science
- Donald M. Coats (1964–1988)..... Educational Services
- Ralph C. Collins (1955–1974)..... Education
- Spelman B. Collins (1940–1968)..... Animal Husbandry
- E. Wesley Conner (1963–1988)..... Ornamental Horticulture
- David W. Cook (1941–1977)..... Mathematics and Academic Affairs
- Frank G. Coyes (1965–1983)..... Agricultural Engineering
- Franklin S. Crane (1958–1985)..... Mechanical Engineering
- A. Norman Cruikshanks (1947–1971)..... Social Sciences
- James T. Culbertson (1953–1977)..... Philosophy
- Carl C. Cummins (1958–1983)..... Dean of Human Development and Education
- William D. Curtis (1961–1989)..... Psychology and Human Development
- Max Darnielle (1967–1989)..... English
- Charles P. Davis (1958–1983)..... Civil and Environmental Engineering
- Arnold M. Dean (1949–1982)..... Soil Science
- Richard Dickey (1956–1986)..... Electronic and Electrical Engineering
- Bruce A. Dickson (1952–1978)..... Soil Science
- Charles E. Dills (1963–1988)..... Chemistry
- Robert Dourson (1967–1987)..... Computer Science
- John E. Dunn, Sr. (1961–1981)..... Agricultural Engineering
- Wesley T. Dunn (1959–1974)..... Graphic Communications
- Bernard W. Dusek (1965–1989)..... Art and Design
- George M. Eastham (1966–1992)..... Economics
- Walter E. Elliott (1965–1983)..... Physics
- Charles A. Elston (1947–1973)..... Mathematics
- James Emmel (1967–1988)..... Speech Communication
- Jon M. Ericson (1970–1991)..... Speech Communication
- Edward J. Ernatt (1958–1983)..... Education
- Warren S. Farrell (1967–1981)..... Agricultural Management
- M. Dale Federer (1963–1987)..... Psychology and Human Development
- Harry C. Finch (1962–1980)..... Biological Sciences
- Michael John Fitzpatrick (1962–1992)..... Electronic and Electrical Engineering
- Millard J. Fotter (1954–1976)..... Industrial Engineering
- Anne C. Fowler (1965–1982)..... Social Science
- Frank Fox (1957–1988)..... Animal Science and Industry
- Freeman Freitag (1966–1992)..... Electronic and Electrical Engineering
- Winton H. Frey, Jr. (1963–1990)..... Ornamental Horticulture
- Arthur H. Frieztzsche (1965–1987)..... English
- Clara B. Froggatt (1964–1980)..... Counseling and Testing
- Robert H. Frost (1953–1983)..... Physics
- George S. Furimsky (1955–1973)..... Engineering Technology
- Timothy A. Gaskin (1970–1991)..... Ornamental Horticulture
- Vincent J. Gates (1958–1977)..... Journalism
- Teymoor Gedayloo (1965–1992)..... Physics
- Curtis F. Gerald (1964–1980)..... Computer Science and Statistics
- Peter Giambalvo (1968–1992)..... Engineering Technology
- William R. Gibford (1955–1979)..... Animal Science
- J. Corder Gibson (1949–1976)..... Agricultural Education and Dean of Agriculture and Natural Resources
- Margaret J. Glaser (1973–1992)..... University Center for Teacher Education

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- Wallace F. Glidden (1961–1992) Animal Sciences and Industry
- Marcus Gold (1947–1952 and 1954–1980) Audiovisual
- James R. Golden (1967–1983) Industrial Engineering
- Robert Gordon (1967–1992) Ornamental Horticulture
- David M. Grant (1950–1980) ... English and Academic Affairs
- Rufus L. Graves, Jr. (1951–1954 and 1957–1982) Architecture
- Theodore G. Graves (1947–1984) Engineering Technology
- C. Herold Gregory (1950–1970) Printing Technology and Management
- Lester W. Gustafson (1947–1971) .. Aeronautical Engineering
- Kenneth L. Haggard (1967–1986) Architecture
- Richard E. Hall (1946–1977) Engineering Technology
- Barbara M. Hallman (1973–1991) History
- Charles J. Hanks (1954–1983) Mathematics
- Reino Hannula (1962–1981) Computer Science and Statistics
- Phyllis J. Hansen (1963–1990) Library
- F. Sheldon Harden (1948–1987) Physical Education and Recreation Administration
- Leroy M. Harris (1954–1986) Animal Sciences and Industry
- Charles Haskell (1963–1988) Mathematics
- David S. Hatcher (1980–1992) Architectural Engineering
- James H. Hayes (1969–1992) Journalism
- Harry Hazebrook (1968–1990) Electronic and Electrical Engineering
- John R. Healey (1947–1980) Journalism
- Anatol Helman (1957–1974) Architecture
- Frank J. Hendel (1967–1984) Aeronautical Engineering
- Harold J. Hendriks (1952–1978) Electronic and Electrical Engineering
- Donald W. Hensel (1960–1990) History
- Charles A. Herald (1958–1975) Electronic and Electrical Engineering
- Earl R. Hesch (1956–1983) Engineering Technology
- William R. Hicks (1957–1983) Physical Education
- Robert Hill (1976–1991) Accounting
- George E. Hoffman (1956–1979) Industrial Engineering
- Wilbur C. Hogan (1959–1973) Philosophy
- Roy B. Hollstien (1973–1988) Computer Science
- Ray J. Holt (1955–1978) Physics
- Walter E. Holtz (1954–1966 and 1968–1982) Environmental Engineering
- Gilbert L. Homfeld (1960–1976) Mathematics
- Harry Honegger (1961–1986) Metallurgical Engineering
- Robert Hooks (1966–1988) Animal Science and Industry
- H. Clyde Hostetter (1958–1983) Journalism
- A. L. Houk (1946–1972) Chemistry
- Jerome F. Houlis (1959–1992) Chemistry
- Ernest R. Houston (1957–1983) Ornamental Horticulture
- LeRoy B. Hughes (1950–1971) Physical Education
- Robert J. Huot (1963–1986) English
- Edgar A. Hyer (1951–1981) Agricultural Management
- C. Dennis Hynes (1957–1990) Biological Sciences
- Gloria Jameson (1967–1988) English
- Starr Jenkins (1961–1988) English
- Boyd W. Johnson (1969–1991) Mathematics
- Corwin M. Johnson (1967–1987) Crop Science
- Mead R. Johnson (1956–1980) English
- Miles B. Johnson (1957–1983) English
- Richard F. Johnson (1950–1988) Animal Sciences and Industry
- Robert M. Johnston (1946–1954 and 1956–1974) Engineering Technology
- Thomas V. Johnston (1967–1985) Art and Associate Dean of Communicative Arts and Humanities
- Jack B. Jones (1969–1991) University Center for Teacher Education
- Edward J. Jorgensen (1947–1976) Physical Education
- William B. Judd (1956–1981) Mathematics
- John J. Kane (1969–1984) Aeronautical and Mechanical Engineering
- James Y. Katekaru, (1969–1992) Chemistry
- Thomas D. Kay (1958–1991) Engineering Technology
- Roger A. Keech (1965–1983) Aeronautical and Mechanical Engineering
- Rodney Keif (1960–1988) Mechanical Engineering
- Helen P. Kelley (1966–1985) Art
- Paul Kenyon (1957–1982) Business Administration
- Chi Su Kim (1974–1992) University Library
- Donald Koberg (1962–1992) Architecture
- Richard T. Kombrink (1956–1980) ... Engineering Technology
- Russell Korsmeyer (1958–1978) Electronic and Electrical Engineering
- Lloyd H. Lamouria (1965–1987) Agricultural Engineering
- Alexander N. Landyshev (1956–1972) Electronic and Electrical Engineering
- James A. Langford (1955–1976) Education
- Paul S. Lansman (1964–1979) Mathematics
- Thomas Lee (1952–1988) Physical Education and Recreation Administration
- Robert B. Leonesio (1972–1992) Materials Engineering
- Vance D. Lewis (1946–1972) Physics and School of Science and Mathematics
- Charles H. Lindamood (1958–1979) English
- H. Clay Little (1973–1992) Agribusiness
- Willard H. Loper (1955–1983) Agricultural Engineering
- Bernice B. Loughran (1958–1980) Art
- John J. Lowry (1962–1987) Mathematics
- Thomas M. Lukes (1962–1985) Food Science
- George R. Mach (1954–1991) Mathematics
- Hans Mager (1949–1985) Architectural Engineering
- Leon W. Magur (1958–1983) Physics
- Ena L. Marston (1946–1970) English
- Angelina Martinez (1966–1991) University Library
- Scott J. Maughan (1965–1980) History
- John W. McCombs (1960–1991) Electronic and Electrical Engineering
- Robert F. McDonnell (1975–1991) English
- Michael E. McDougall (1972–1992) City and Regional Planning
- Willard L. McGonagill (1967–1989) Architecture
- James M. McGrath (1946–1975) Engineering Technology
- Malcolm McLeod (1973–1988) Biological Sciences
- George H. McMeen (1960–1977) Mathematics
- Mac McRobbie (1962–1979) Industrial Technology
- John L. Merriam (1958–1978) Agricultural Engineering
- Thomas O. Meyer (1955–1979) Food Science
- Allen D. Miller (1960–1983) Mathematics
- Harold R. Miller (1968–1991) Accounting
- Dragoslav M. Misic (1970–1991) Civil and Environmental Engineering
-

- Karen Moerman (1969–1989) Home Economics
 Sixto E. Moreira (1972–1991) Architecture
 Donald Morgan (1968–1988) Industrial Engineering
 Morris, Don M. (1957–1962 and 1969–1992) University Center for Teacher Education
 John H. Mott (1967–1983) English
 Billy W. Mounts (1956–1977) Health Center Physician and Surgeon
 Carl F. Moy (1968–1984) Dairy Science
 George T. Murray (1978–1992) Materials Engineering
 Richard F. Nelson (1960–1989) Biological Sciences
 Loren L. Nicholson (1956–1979) Journalism
 Dell O. Nickell (1964–1980) Architectural Engineering
 Keith E. Nielsen (1959–1991) Speech Communication
 Philip W. B. Niles (1967–1992) Mechanical Engineering
 Shien Hwei Niu (1969–1992) University Library
 Glenn A. Noble (1947–1973) Biological Sciences
 Thomas F. Nolan (1949–1974) Political Science
 Raymond E. Nordquist (1965–1991) Architecture
 David E. Nutter (1974–1992) Accounting
 Eugene L. O'Connor (1964–1991) Business Administration
 Howard R. O'Daniels (1938–1971) Business Administration
 Michael J. O'Leary (1951–1982) Social Science
 Barton C. Olsen (1968–1990) History
 Leon F. Osteyee (1957–1983) Aeronautical and Mechanical Engineering
 Philip H. Overmeyer (1958–1972) Business Administration
 Gordon J. Paul (1969–1983) Accounting
 Evelyn I. Pellaton (1966–1982) Physical Education
 Pratapsinha C. Pendse (1966–1993) Biological Sciences
 Dominic Perello (1954–1987) Economics
 James M. Peters (1958–1980) Chemistry
 James J. Peterson (1964–1984) English
 William J. Phaklides (1963–1984) Engineering Technology
 William Phillips (1957–1987) Architectural Engineering
 Daniel D. Piel (1980–1992) Art and Design
 David R., Pierce, Jr. (1981–1992) Construction Management
 Richard A. Pimentel (1952–1983) Biological Sciences
 Curtis Piper (1964–1988) Soil Science
 Louis D. Pippin (1970–1992) University Center for Teacher Education
 Clifford J. Price (1956–1974) Aeronautical Engineering
 Derek Price (1957–1989) Mechanical Engineering
 Peter Rabe (1967–1986) Psychology and Human Development
 Jimmy H. Railey (1977–1992) Physical Education
 Larry P. Rathbun (1970–1992) Agricultural Education
 Evelyn D. Reagan (1946–1948 and 1954–1977) Library
 R. Howell Reece (1946–1964) Mechanical Engineering
 Ronald D. Regan (1977–1991) Ornamental Horticulture
 Howard Rhoads (1956–1983) Crop Science
 Glenn W. Rich (1953–1979) Agricultural Engineering
 Carlos C. Richards (1946–1971) Engineering Technology
 Herman E. Rickard (1959–1990) Dairy Science
 Rolla W. Rider, Jr. (1960–1982) Business Administration
 Eugene A. Rittenhouse (1949–1976) Economics and Placement
 Aryan I. Roest (1955–1990) Biological Sciences
 John A. Rogalla (1959–1992) Agribusiness
 David Rollings (1968–1987) English
 Arthur Z. Rosen (1953–1993) Physics
 Robert L. Rosenberg (1970–1985) History
 Mona G. Rosenman (1971–1992) English
 Mildred Roske (1967–1988) Home Economics
 Pasha Rostov (1978–1992) Computer Science
 Patricia Saam (1966–1992) Food Science and Nutrition
 Glenn W. Salo (1955–1990) Agricultural Engineering
 David J. Sanchez (1970–1992) University Center for Teacher Education
 James D. Sanderson (1967–1992) Intercollegiate Athletics
 Doral R. Sandlin (1969–1992) Aeronautical Engineering
 Leo E. Sankoff (1942 and 1946–1980) Agricultural Education
 Harry H. Scales (1958–1976) Education
 Paul E. Scheffer (1964–1983) Industrial Engineering
 Helmut Schleicher (1970–1988) Construction Management
 Walter P. Schroeder (1957–1980) Education
 Kenneth E. Schwartz (1952–1988) Architecture
 Marcel E. Sedletzky (1974–1991) Architecture
 Glenn E. Seeber (1954–1979) Engineering Technology
 Owen L. Servatius (1947–1983) Management
 Gordon A. Silver 1964–1986 Physics
 Orien W. Simmons (1961–1980) Metallurgical and Welding Engineering
 Howard F. Smith (1968–1983) Economics
 J. Murray Smith (1960–1981) Speech Communication
 M. Eugene Smith (1946–1974) History
 Warren T. Smith (1952–1973) Dean of Agriculture
 L. Robert Sorensen (1966–1983) Psychology
 Shirley R. Sparling (1963–1991) Biological Sciences
 Ruth G. Spencer (1967–1982) Library
 Verlan Stahl (1968–1987) Foreign Languages
 William D. Stansfield (1963–1992) Biological Sciences
 Eugene E. Starkey (1978–1991) Dairy Science
 John Stechman (1960–1989) Animal Sciences and Industry
 Howard Steinberg (1970–1991) Mathematics
 Fred H. Steuck (1947–1978) Electronic and Electrical Engineering
 Edward O. Stoffel (1957–1988) Mechanical Engineering
 Ellen T. Stookey (1961–1978) Home Economics
 J. Edward Strasser (1960–1984) Industrial Technology
 L. Harry Strauss (1961–1976) Library
 John S. Stuart (1964–1983) Architecture
 Vern Swansen (1969–1989) Architecture
 Laurence F. Talbott (1966–1987) Industrial Technology
 Fuad H. Tellew (1960–1991) Economics
 John W. Thomas (1968–1992) Biological Sciences
 David H. Thomson (1946–1979) Biological Sciences
 Frank P. Thrasher (1963–1980) Crop Science
 William Thurmond (1951–1989) Biological Sciences
 Harmon B. Toone (1952–1977) Dairy and Poultry Science
 Neal R. Townsend (1965–1991) Mathematics
 Dean Trembly (1961–1976) Counseling and Testing
 William R. Troutner (1942–1976) Crop Science
 Joseph Truex (1954–1986) Graphic Communication
 Pearl Turner (1951–1974) Library
 Robert G. Valpey (1972–1983) Dean of Engineering and Technology
 Gordon L. Van de Vanter (1968–86) Crop Science
 Herman C. Voeltz (1965–1983) History
 Ralph M. Vorhies (1946–1980) Crop Science
 Evelyn K. Voros (1955–1974) Speech
 William B. Wahl (1966–1985) English
 Howard D. Walker (1957–1991) Chemistry

Isaac N. Walker (1967–1983).....English	1968–69	Robert M. Johnson, Mechanical Engineering
Edward John Ward (1970–1989) . City and Regional Planning		Bruce Kennelly, Chemistry
Barbara P. Weber (1966–1992)..... Home Economics		Alice E. Roberts, Education
Neil W. Webre (1969–1992).....Computer Science	1969–70	Donald W. Hensel, History
James Webster, Jr. (1965–1987).....Agricultural Engineering		David H. Montgomery, Biological Sciences
John West (1968–1988).....School of Agriculture		Philip H. Overmeyer, Business Administration
Glenn V. Whaley (1963–1992)..... University Library		Willard M. Pederson, English
Marvin J. Whalls (1968–1989)..... Biological Sciences		Omer K. Whipple, Chemistry
Marylinda Wheeler (1975–1992).....Physical Education	1970–71	Robert L. Cleath, Speech
Robert R. Wheeler (1961–1992).....Animal Sciences and Industry		Kenneth E. Schwartz, Architecture
Omer K. Whipple (1956–1976).....Chemistry	1971–72	Hewitt G. Wight, Chemistry
Mary Lou White (1961–1979).....Physical Education		Stuart E. Larsen, Aeronautical Engineering
Francis F. Whiting (1946–1970).....Engineering Technology		Barton C. Olsen, History
Milo E. Whitson (1947–1974)..... Mathematics		Ronald L. Ritschard, Biological Sciences
H. Glenn Wight (1952–1990).....Chemistry		Joseph N. Weatherby, Political Science (Social Sciences)
J. Barron Wiley (1956–1978).....Education	1972–73	Lyle G. McNeal, Animal Science
Richard C. Wiley (1946–1983).....Metallurgical and Welding Engineering		Charles W. Quinlan, Architecture
Maurice L. Wilks (1966–1983).....Architecture	1973–74	James E. Simmons, English
Graydon J. Williams (1970–1991)..... Music		William J. Phaklides, Engineering Technology
Irwin A. Willson (1958–1975).....Education		Louis D. Pippin, Education
Harold O. Wilson (1936 and 1946–1974).....Administrative Vice President	1974–75	Duane O. Seaberg, Agricultural Management
Malcolm W. Wilson (1968–1989).....Academic Affairs Vice President		Peter Jankay, Biological Sciences
C. Paul Winner (1940–1971).....Agricultural Mechanics	1975–76	Josephine S. Stearns, Child Development
Victor F. Wolcott (1962–1983)..... Business Administration		George J. Suchand, Social Sciences
Paul Wolff (1971–1992).....Architecture	1976–77	James Hayes, Journalism
John A. Woodworth (1949–1974)..... Mathematics		William V. Johnson, Music
John Wordeman (1973–1988).....Graphic Communication	1977–78	Erna Knapp, Art
Lloyd J. Work (1958–1978)..... Physics		Harry L. Fierstine, Biological Sciences
Marshall S. Wright, Jr. (1969–1988).....Chemistry		Grant D. Venerable II, Chemistry
Raymond A. Wysock (1967–1991).....Industrial Technology	1978–79	Ralph M. Warten, Mathematics
		Timothy M. Barnes, History
		Donald P. Grant, Architecture and Environmental Design
		John C. Syer, Political Science
	1979–80	Pat Pendse, Biological Sciences
		Dane Jones, Chemistry
		Adelaide Harmon-Elliott, Mathematics
	1980–81	David J. Keil, Biological Sciences
		Thomas Ruehr, Soil Science
		Stephen Weinstein, Mathematics
		Michael D. Zohns, Ornamental Horticulture
	1981–82	Sarah E. Burroughs, Food Science and Nutrition (Child Development and Home Economics)
		Christina Orr-Cahall, Art
		Kendrick W. Walker, Philosophy
	1982–83	Christina A. Bailey, Chemistry
		Kenneth E. Ozawa, Physics
		Thomas L. Richards, Biological Sciences
	1983–84	James Bermann, Agricultural Engineering
		Donald J. Koberg, Architecture
		Jack D. Wilson, Aeronautical and Mechanical Engineering
	1984–85	Euel W. Kennedy, Mathematics
		William L. Preston, Social Sciences
		Michael J. Wenzl, English
	1985–86	Robert S. Cichowski, Chemistry
		Harvey C. Greenwald, Mathematics
		Max E. Riedlsperger, History
		Edward H. Baker, Mechanical Engineering
		Sue McBride, Education
		Phillip K. Ruggles, Graphic Communication

DISTINGUISHED TEACHER AWARD RECIPIENTS

In 1963 the University instituted a program of recognizing outstanding teaching efforts through the Distinguished Teacher Awards. Selections for this honor are based upon recommendations of the Academic Senate committee which follows the procedure of soliciting nominations from students and colleagues. Evaluations and subsequent recommendations of the nominees are based upon an in-depth review by the committee, including classroom visitations. Recipients of the Distinguished Teacher Awards and their departments since the inception of the program are listed below.

1963–64	Robert E. Holmquist, Physics
	John L. Merriam, Agricultural Engineering
1964–65	Joy O. Richardson, Mechanical Engineering
	Milo E. Whitson, Mathematics
1965–66	A. Norman Cruikshanks, Social Sciences
	Richard F. Johnson, Animal Husbandry
	George R. Mach, Mathematics
1966–67	Robert W. Adamson, Mechanical Engineering
	Kenneth G. Fuller, Mathematics
	William D. Curtis, Psychology
1967–68	Rodney G. Keif, Environmental Engineering
	David M. Grant, English
	Wesley S. Ward, Architecture

1986-87	Boyd W. Johnson, Mathematics Craig H. Russell, Music Calvin H. Wilvert, Social Sciences
1987-88	James R. Mueller, Mathematics Ronald S. Mullisen, Mechanical Engineering Robert G. Reynolds, Art and Design
1988-89	Stephen W. Ball, Philosophy George B. Cotkin, History Abraham B. Shani, Management
1989-90	Lloyd N. Beecher, History Talmage E. Scriven, Philosophy Jan W. Simek, Chemistry
1990-91	Jay L. Devore, Statistics Linda H. Halisky, English Ann Morgan, Psychology James L. Webb, Physical Education and Recreation Administration
1991-92	Mary E. Pedersen, Food Science and Nutrition John Snetsinger, History W. Fred Stultz, Psychology and Human Development
1992-93	Susan Duffy, Speech Communication Donald K. Maas, University Center for Teacher Education Charles M. Slem, Psychology and Human Development

STAFF EMERITI

(Dates indicate period of service)

Vic Allen (1951-1976)	Custodial Services
Edna Anderson (1964-1986)	Foundation
Peggy Arnold (1965-1991)	School of Business
Grace Arvidson (1951-1991)	President's Office
Antonio Avelar (1972-1992)	Facilities Services
Mary L. Bachino (1968-1991)	Alumni Relations
Shirley Backer (1968-1988)	Foreign Languages
Fern Ballard (1954-1974)	Foundation
Patricia Barker (1964-1988)	Foundation
Joe C. Baze (1962-1980)	Plant Operations
Gertrude E. Beck (1968-1983)	Activities Planning
James P. Becker (1962-1980)	Plant Operations
Pat Belveal (1977-1992)	Budget Planning and Administration
Dolores Bennett (1971-1988)	Evaluations
Alva F. Bingham (1961-1985)	Food Services
Dorothy M. Bishop (1962-1980)	Education
Doris Bodine (1961-1978)	Food Services
Leona M. Boerman (1944-1967)	President's Office
Charles Boling (1968-1988)	Athletics
Robert V. Bonds, Jr. (1972-1991)	Learning Center
Robert M. Bostrom (1956-1992)	Housing
Phyllis Breckan (1973-1990)	Academic Programs
Richard Brug (1978-1991)	Public Safety
Jerold L. Budoff (1957-1988)	Residence Hall Services
Elinor Bullock (1970-1986)	General Office
Harold A. Burnett (1962-1977)	Agriculture and Natural Resources
Carma Burns (1966-1990)	Electronic and Electrical Engineering
William K. Butts (1965-1980)	Plant Operations
Rosemary Cameron (1964-1989)	University Library
James Capetillo (1969-1991)	Plant Operations

Noel Carmack (1974-1989)	Public Safety
Orlan Casey (1957-1983)	Plant Operations
Fred Casillas (1964-1989)	Plant Operations
Guadalupe Casillas (1969-1992)	Facilities Services
Aurelia Castaneda (1973-1993)	Health Services
Robert Clark (1975-1990)	Plant Operations
George W. Cockriel (1957-1977)	University Police
Loretta I. Costen (1953-1976)	Engineering and Technology
Bernard R. Cox (1968-1988)	Aeronautical Engineering
Donald J. Curtis (1960-1976)	Health Center
Roy E. Darr (1953-1971)	Plant Operations
Yvonne Dengler (1967-1991)	Theatre and Dance
Elizabeth D. Dickens (1961-1980)	Architecture and Environmental Design
Lloyd G. Dietrich (1953-1973)	University Police
Paul S. Dillon (1947-1971)	Foundation
Johnie Dixon (1973-1992)	Facilities Services
Everette Dorough (1953-1987)	Foundation Food Services
Zeta DuBarry (1974-1992)	Financial Aid
Colier Duncan (1955-1977)	Plant Operations
John Dyer (1963-1979)	Plant Operations
Lilly Ellsworth (1969-1989)	Housing and Conference Services
Merriam J. Erickson (1962-1980)	Plant Operations
Wilbur T. Erpenbach (1967-1982)	Electronic and Electrical Engineering
Robert A. Escobedo (1969-1985)	Plant Operations
Juanita Faye Esmon (1972-1991)	Plant Operations
Lloyd R. Evans (1959-1978)	Grounds
Mary Eyler (1961-1980)	Financial Aid
James Farrar (1968-1989)	Facilities Administration
Patricia A. Eilers Farrow (1957-1972)	Health Center
Leroy Fauset (1966-1983)	El Corral Bookstore
Albert Felis (1951-1991)	Plant Operations
James Fiscalini (1966-1982)	Farm Shop
Bernard J. Fitzgerald (1958-1980)	Mail Room
David Focht (1969-1991)	Ornamental Horticulture
Alice Foy (1962-1987)	Foundation Business Office
Juanita A. Fredericks (1954-1974)	El Corral Bookstore
Altha Freeman (1967-1988)	Evaluations
Robert J. Fritts (1965-1985)	Plant Operations
Jack Fryer (1968-1984)	Foundation Personnel
Donna D. Gang (1968-1991)	Student Health Services
Helen K. Garing (1966-1983)	Crop Science
Gerard Gentilucci (1973-1991)	Plant Operations
E. Douglas Gerard (1952-1991)	Facilities Administration
Roy Gersten (1967-1984)	Associated Students, Inc.
Lena Gianolini (1949-1972)	Business Affairs
Jean Gordon (1969-1992)	Library Services
Ruth Gran (1957-1975)	Health Center
Josephine R. Graves (1964-1982)	Health Center
Margaret Green (1960-1977)	Food Services
Mary Lee Green (1948-1976)	El Corral Bookstore
Michael C. Grom (1968-1986)	Plant Operations
Leonard Hall (1968-1991)	Plant Operations
Farlin Halsey (1963-1991)	Farm Operations
Joseph C. Hampl (1943-1971)	Foundation
Richard Harrison (1969-1988)	Art and Design
Bill Hart (1960-1991)	Plant Operations
Dora L. Harter (1968-1983)	Learning Assistance Center
Florence I. Hauge (1962-1983)	Library
Eugene Haugh (1966-1988)	Ornamental Horticulture

Walter Heffner (1965–1983).....	Computer Center
John A. Heinz (1953–1986).....	Audiovisual Services
Norma Henderson (1949–1983).....	Academic Affairs
Ferdinand Herriman (1966–1987).....	Plant Operations
Jarilyn H. Hobberlin (1968–1987).....	Payroll Services
F. Jerald Holley (1961–1983).....	Admissions, Records, and Evaluations
Alicemae Hollings (1966–1982).....	Foundation
Lillian R. Hooks (1964–1980).....	Library
Catherine S. Hoover (1945–1946) (1962–1983).....	Science and Mathematics
Irene R. Horvath (1950–1983).....	Communicative Arts and Humanities
Lorraine H. Howard (1964–1991).....	Psychological Services
Margaret Hoyt (1948–1981).....	El Corral Bookstore
Clara Huffman (1959–1974).....	El Corral Bookstore
Hazel L. Hunter (1965–1980).....	Evaluations
Esther Iglesias (1972–1988).....	Philosophy
Robert Irvine (1975–1991).....	Plant Operations
Marie Williams Janolis (1962–1977).....	Engineering Technology
Frank Jansen (1971–1992).....	Electronic/Electrical Engineering
Edwin Jensen (1976–1993).....	Campus Dining
Elmer R. Johnson (1966–1982).....	Physics
John Johnson (1965–1992).....	Facilities Services
Mary L. Johnson (1950–1976).....	Administrative Affairs
Tommie L. Jones (1964–1980).....	Business Affairs
Connie Jonte (1961–1983).....	Alumni Services
Robert Kimble (1963–1992).....	Theatre & Dance
Jack Kirchner (1969–1990).....	Plant Operations
Edwin Koch (1961–1976).....	Foundation Custodial
Edna J. Kuhnes (1969–1984).....	Library
Zoilo Lagunday (1977–1991).....	Plant Operations
George Lancaster (1962–1979).....	Plant Operations
James R. Landreth (1956–1991).....	Business Affairs
Ronald J. Larsen (1968–1983).....	Public Safety
Lois L. Larson (1962–1978).....	Health Center
Marianne Lefebvre (1968–1984).....	Financial Operations
Ervin A. Lembcke (1962–1980).....	Plant Operations
Alfons P. Lerno (1965–1983).....	Plant Operations
Francisco Limon (1961–1991).....	Physical Education and Recreation Administration
Neile Lincoln (1968–1992).....	Public Safety
Wayne Lindsey (1953–1983).....	Farm Shop
Joe A. Lipe (1965–1980).....	Plant Operations
Robert A. Lucas (1975–1992).....	Graduate Studies and Research
Irene Lund (1961–1984).....	Foundation
Ruth Lundquist (1960–1979).....	Business Affairs
Josephine E. Maddalena (1965–1980).....	Physical Education
James Mapes (1961–1977).....	University Police
Anne B. Marcell (1961–1982).....	Evaluations
Salvador R. Mares (1974–1991).....	Physical Education and Recreation Administration
Naomi Marks (1970–1993).....	Health Services
Anna M. Martinez (1974–1991).....	Fiscal Operations
K. Jon Mayeda (1954–1982).....	Plant Operations
Barbara A. McCaleb (1975–1991).....	Ornamental Horticulture
Donald L. McCaleb (1962–1991).....	Communications and Special Events
Marion McCoy (1973–1990).....	Foundation Food Services
Daniel H. McCready, Jr. (1961–1983).....	Plant Operations
Jackie McDaniel (1970–1990).....	Warehouse
Dorothy J. McDonald (1963–1985).....	Telecommunications
John McGrath (1970–1988).....	Warehouse
Florence H. Mesler (1962–1983).....	Health Center
Julius F. Metz (1968–1983).....	Plant Operations
Viola E. Hughes Milburn (1956–1978).....	Health Center
Robert J. Miller (1960–1980).....	Business Affairs
Peggy Milburn (1966–1988).....	Foundation
David Mosher (1974–1992).....	Materials Engineering
A. Teresa Mounier (1970–1986).....	Purchasing
Nancy Muir (1962–1991).....	Psychological Services
George Mulder (1968–1991).....	Counseling Services
Robert Myers (1967–1988).....	Architecture
Valdora Myers (1960–1978).....	Health Center
Harold A. Nash (1947–1974).....	Power Plant
James H. Nash (1977–1991).....	Student Health Services
James Neal (1954–1990).....	Foundation
James G. Neelands (1957–1991).....	School of Science and Mathematics
Margaret Nelson (1959–1977).....	Housing
Avice I. Nolan (1960–1980).....	Audiovisual
Edward L. Nolan (1953–1979).....	Mechanical Engineering
Aldyth O'Brien (1979–1992).....	Agricultural Engineering
Jack O'Dell (1953–1986).....	Foundation
Lee Owen (1946–1978).....	Plant Operations
L. Ruth Palmer (1971–1987).....	Foundation Business Office
Kathryn Patterson (1960–1982).....	Procurement and Support Services
Alfred J. Pelucca (1956–1971).....	Custodial Services
Joseph C. Pereira (1970–1985).....	Plant Operations
Bernita Persall (1964–1990).....	Relations with Schools
Wilma Pierce (1971–1988).....	Foundation
Donna Porter (1962–1986).....	Student Health Services
June Powell (1947–1991).....	University Relations
Gerald N. PUNCHES (1971–1992).....	Enrollment Support Services
Helen PUNCHES (1973–1992).....	University Outreach
John Rankin (1974–1991).....	Facility Services
Jerry Roberts (1974–1992).....	Payroll Services
Joan Roberts (1958–1980).....	Foundation
Henry Robinson (1958–1992).....	Foundation
Gerolamo Salmina (1969–1991).....	Plant Operations
Rafael Sanchez (1970–1991).....	Plant Operations
Al Sanders (1964–1979).....	Grounds
Gloria Sanderson (1978–1993).....	Campus Dining
Julia Sandoval (1973–1993).....	Campus Dining
Aldora Santos (1972–1988).....	Physical Education
Edmond L. Schellenger (1966–1983).....	Plant Operations
Byrle Schoepf (1973–1991).....	Plant Operations
Ralph Schurtz (1949–1973).....	Custodial Services
Mary E. Scrivner (1966–1983).....	Academic Programs
Pauline Shaffer (1969–1989).....	Foundation Food Services
Tania Shwetz (1969–1992).....	School of Liberal Arts
Mary Smith (1960–1988).....	Personnel and Employee Relations
David H. Snyder (1970–1989).....	Enrollment Support Services/Admissions
F. Yvonne Southgate (1963–1980).....	Mechanical Engineering
Ethel Spry (1962–1985).....	Associated Students, Inc.
James Stacy (1970–1988).....	Audio Visual Services
Jean Steck (1960–1975).....	Industrial Engineering
Marcie Steger (1962–1979).....	Food Services
Valerie Steinmann (1968–1990).....	Fiscal Operations
Walter Stier (1970–1991).....	School of Architecture and Environmental Design

FACULTY AND STAFF

(Number in parentheses indicates year of appointment)

Listed as of March, 1994

- ABITIA, FRED (1969) Industrial Technology
B.A., San Jose State College, 1964; M.A., 1966; Ed.D., Washington State University, 1971. Professor and Department Head.
- ABSHIRE, FRANKLIN P. (1977) Engineering Technology
B.S., Arizona State University, 1969; M.S., 1974. Professor. Registered Professional Engineer, Arizona, Ohio.
- ACETO, JEANNE C. (1981) College of Engineering
B.A., Whittier College, 1965; M.A., Stanford University, 1966. Director, Women's Engineering Program.
- ACORD, DORIS (PAT) (1980) Physical Education and Kinesiology
B.A., Morehead State, 1961; M.A., Ball State University, 1965; M.A., Southern Illinois University, 1975; Ph.D., 1977. Professor.
- ADALIAN, PAUL T., JR. (1978) University Library
B.A., Stanislaus State College, 1966; M.A., Loyola University of Los Angeles, 1968; M.L.S., Syracuse University, 1971. Librarian.
- AGBO, SAMUEL O. (1991) Electronic and Electrical Engineering
B.Sc., University of Nigeria, 1975; M.S.E., University of Michigan, 1978; Ph.D., University of Houston, 1984. Associate Professor.
- AGRONSKY, STEVEN J. (1981) Mathematics
B.A., University of California, Santa Barbara, 1970; M.S., 1972; Ph.D., 1974. Professor.
- AHERN, JAMES J. (1980) Agribusiness
B.S., California State Polytechnic College, Pomona, 1971; M.S., University of Maryland, 1973; Ph.D., 1980. Professor.
- AIKEN, JAMES L. (1976) Psychological Services
B.A., University of Florida, 1964; M.Ed., 1965; Ph.D., Missouri University, 1970. Diplomate in Counseling Psychology of American Board of Professional Psychology. Associate Director.
- ALEXANDER, ZOE (1991) Psychological Services
B.A., Stanford University, 1965; M.A., University of Michigan, 1967; Ph.D., Ohio State University, 1970; Ph.D., California Graduate School, San Rafael, 1987. Counselor.
- AL-HADAD, SABAH (1965) Mathematics
B.S., Texas Technological College, 1960; M.A., California State Polytechnic College, 1962; Ed.D., Arizona State University, 1972. Associate Professor.
- ALLEN, CHARLES R. (1986) University Relations and Development
B.A., Kansas Wesleyan University, 1957; M.Ed., Xavier University, 1958. Executive Director, University Relations and Development.
- ALLEN, PRESTON C. (1993) Residential Life and Education
B.A., Michigan State University, 1980; M.S., California State University, Fullerton, 1989. Director.
- ALESHIRE, SHELLEY (1992) Student Academic Services
B.A., California State University, Fullerton, 1974. Disability Management Specialist, Disabled Student Services.
- ALPTEKIN, SEMA E. (1994) Industrial and Manufacturing Engineering
B.Sc., Istanbul Technical University, Istanbul, 1973; M.Sc., 1975; Ph.D., 1981. Professor.
- AMANZIO, JOSEPH C. (1971) Architecture
B.Arch., University of Florida, 1967; M.Arch., Washington University, 1974. Professor. Registered Architect, California.
- AMARAL, ALFRED W. (1967) University Foundation
B.S., California State Polytechnic College, 1964; M.B.A., Golden Gate College, 1970. Executive Director.
- AMEDEE, GASTON (1976) Soil Science
B.S., University of Haiti, 1963; M.S., University of Connecticut, 1971; Ph.D., Cornell University, 1974. Professor.
- AMSPACHER, WILLIAM H. (1985) Agribusiness
B.S., Clemson University, 1978; M.S., 1980; Ph.D. University of California, Davis, 1988. Associate Professor.
- ANDERSON, C. ROBERT (1982) University Relations and Development
B.A., Duke University, 1965; M.A., University of Missouri, 1973. Communications Officer.
- ANDERSON, JAMES A. (1987) Accounting
B.A., DePauw University, 1968; Ph.D., Washington University, 1973. Professor.
- ANDOLI, FREDERICK P. (1968) Biological Sciences
B.A., Upsala College, 1963; M.S., Utah State University, 1968; D.A., Idaho State University, 1974. Professor.
- ANDRE, BARBARA R. (1973) International Programs
B.A., Humboldt State College, 1969; M.A., California State Polytechnic College, 1971; Ed.D., University of San Francisco, 1986. International Student Advisor.
- ANDREWS, CHARLES T. (1972) Accounting
B.S., Eastern Illinois University, 1960; M.B.A., Bowling Green State University, 1963; D.B.A., Indiana University, 1968. Professor. Certified Public Accountant.
- ANGLEY, STEPHEN F. (1982) Ornamental Horticulture
B.S., Berea College, 1969; M.S., Clemson University. Professor and Interim Department Head.
- APFELBERG, HERSCHEL L. (1971) Graphic Communication
B.S., Rochester Institute of Technology, 1965; M.A., California Polytechnic State University, San Luis Obispo, 1973. Professor.
- ARMSTRONG, GENE A. (1970) Animal Science
B.S., California Polytechnic State University, San Luis Obispo, 1972. Professor.
- ARMSTRONG, MARY BETH (1984) Accounting
B.S., University of Nevada, Reno, 1968; M.B.A., California State Polytechnic University, Pomona, 1976; Ph.D., University of Southern California, 1984. Professor. Certified Public Accountant.
- ARVIZU-RODRIGUEZ, MARIA (1987) Admissions
B.S., California Polytechnic State University, San Luis Obispo, 1987. Admissions Officer.
- ASCOLI, RICHARD V. (1986) Health Services
B.S., College of William and Mary, 1965; M.D., Medical College of Virginia, 1974; Internship and Residency in Emergency Medicine, University of Southern California—Los Angeles County General Hospital, 1982. Physician.
- ATRE, SHARAD D. (1974) Architecture
B.Arch., University of Baroda, India, 1963; B.Arch., Washington University, 1965; M.Arch., University of Colorado, 1973. Professor. Registered Architect: California and India.
- ATTALA, EMILE E. (1970) Computer Science
B.S., Cairo University, Egypt, 1958; M.S., University of California, Berkeley, 1964; Ph.D., University of California, Santa Barbara, 1974. Professor.
- ATWOOD, LINDA (1974) Chemistry
B.A., Bard College, 1968; M.A., Wesleyan University, 1973; Ph.D., 1974. Professor.
- AVEY, RENNY J. (1973) Agribusiness
B.S., California State Polytechnic College, 1969; M.S., Oregon State University, 1972; Ph.D., University of Hawaii, 1974. Professor.
- AVILES, BRIAN A. (1989) Landscape Architecture
B.L.A., University of Arizona, Tucson, 1983; M.L.A., Harvard University, 1989. Assistant Professor. Registered Landscape Architect, California.
- AXELROTH, ELIE (1984) Psychological Services
B.A., State University of New York, Albany, 1976; M.A., University of Maryland, 1978; Psy.D., University of Denver, 1983. Counselor.
- BACHMAN, ALFRED M. (1970) Mathematics
B.S., Western Oregon State College, 1952; M.Ed., 1960, M.S., 1964; Ph.D., University of Oregon, 1968. Associate Professor.

- BACHMANN, JOHN E., MAJ. (1987) Military Science
B.S., Bernard M. Baruch College, C.U.N.Y., 1977; M.S., University of Louisville, 1986. Department Head.
- BAGNALL, JAMES R. (1969) Architecture
B.A., Occidental College, 1957; M.Arch., University of California, Berkeley, 1974. Professor and Director.
- BAILEY, CHRISTINA ANNE (1978) Chemistry
B.S., College of Saint Elizabeth, New Jersey, 1964; Ph.D., Purdue University, 1970. Professor.
- BAILEY, PHILIP S. (1969) College of Science and Mathematics
B.S., University of Texas, 1964; Ph.D., Purdue University, 1969. Professor and Dean.
- BAKER, EDWARD H. (1968) Mechanical Engineering
B.S., Northwestern University, 1958; M.S., University of California, 1963; Ph.D., Northwestern University, 1965. Professor.
- BAKER, WARREN J. (1979) President
B.S., University of Notre Dame, 1960; M.S., 1962; Ph.D., University of New Mexico, 1966. President.
- BALASUBRAMANIAN, K. N. (1987) Industrial and Manufacturing Engineering
B.E., University of Madras, India, 1965; M.E., 1968; M.S., Ohio University, 1973; Ph.D., 1976. Professor. Certified in M.T.M., and Production and Inventory Management (C.P.I.M.).
- BALDWIN, MARYLUD (1982) University Center for Teacher Education
A.B., Wilson College, 1967; M.Ed., Virginia Commonwealth University, 1973; Ph.D., University of California, Berkeley and San Francisco State University, 1983. Professor.
- BALGLEY, KATHLEEN A. (1989) English
B.A., University of Illinois, 1974; M.A., University of California, San Diego, 1980; Ph.D., 1986. Assistant Professor.
- BALL, R. WAYNE (1969) Health Services
A.B., Westminster College, Missouri, 1957; M.D., University of Missouri School of Medicine, 1961; Internship, Mercy Hospital, Des Moines; Residency, General Practice, Santa Barbara General Hospital; Board Certified Family Practice, 1974. Associate Director.
- BALL, STEPHEN W. (1983) Philosophy
B.A., Purdue University, 1972; M.A., University of Michigan, 1973; Ph.D., 1978. Professor.
- BALTHASER, LAWRENCE H. (1969) Physics
B.A., Rutgers University, 1960; M.A., Indiana University, 1963; Ph.D., 1969. Professor.
- BARATA, ANTONIO G. (1985) Music
B.A., Towson State University, 1977; M.M., Northwestern University, 1979; D.M.A., University of Illinois, 1985. Associate Professor.
- BARCLAY, KENNETH B. (1979) Student Life and Activities
B.A., Bowling Green State University, 1967; M.A., University of Massachusetts, 1969; Ph.D., Kent State University, 1975. Director.
- BARNES, CAROL E. (1993) Extended Education and Faculty Development
B.A., Arizona State University, 1961; M.A.T., Miami University, 1968; Ph.D., 1981. Dean.
- BARNES, TIMOTHY M. (1969) History
B.A., University of New Mexico, 1965; M.A., 1966; Ph.D., 1970. Professor.
- BARTHEL, KATHARINE M. (1978) Physical Education and Kinesiology
B.S., University of California, Los Angeles, 1961; M.S., University of California, Santa Barbara, 1964; Ph.D., Washington State University, 1973. Professor.
- BASOR, ESTELLE L. (1976) Mathematics
B.A., University of California, Santa Cruz, 1969; Ph.D., 1975. Professor.
- BATTENBURG, JOHN (1989) English
B.A., Andrews University, 1982; M.A., Ohio University, 1984; Ph.D., Purdue University, 1989. Assistant Professor.
- BATTERSON, RONALD E. (1971) Architecture
B.S., University of Cincinnati, 1964; M.Arch., University of Washington, 1970; graduate study, Danish Royal Academy of Arts. Professor. George C. Marshall fellowship grant. Registered Architect, Ohio.
- BAUR, LAWRENCE E., JR. (1965) Accounting
B.B.A., University of Michigan, 1954; M.B.A., 1957. Associate Professor. Certified Public Accountant.
- BEARDSLEY, GEORGE L., JR. (1975) Economics
B.A., University of California, Berkeley, 1971; M.A., University of Pennsylvania, 1973; Ph.D., 1974. Professor.
- BEASON, STEVE B. (1985) Intercollegiate Athletics
B.S., Emporia State University, 1979; M.S., 1985. Head Coach.
- BEECHER, LLOYD N. (1969) History
B.A., California State College, Fullerton, 1965; M.A., 1966; Ph.D., University of Georgia, 1970. Professor.
- BENEDICT, WILLIAM R. (1990) Architecture
B.Arch., Kansas State University, 1967; M.Arch., University of Texas at Austin, 1989. Assistant Professor.
- BENNETT, DARRELL F. (1971) Health Services
B.S., University of Arizona, 1965. Pharmacist.
- BERG, LORRAINE M. (1983) Health Services
R.N., Cuesta College, 1975; N.P. Family Planning, San Jose State University, 1982. Nurse Practitioner.
- BERMANN, JAMES (1964) Agricultural Engineering
B.S., California State Polytechnic College, 1959, 1961; M.S., Michigan State University, 1971; Ed.D., Brigham Young University, 1979. Professor.
- BERRIO, MARGARET M. (1989) Psychology and Human Development
B.Mus., Oberlin College, 1964; M.A., Southern Illinois University, 1967; M.S., Tufts University, 1972; Ph.D., Indiana University, 1974. Professor.
- BERRIO, MARK (1986) Architectural Engineering
B.S., University of El Salvador, 1955; B.S., University of Guatemala, 1963; M.S., University of Michigan, 1965; Ph.D., Michigan State University, 1971. Professor. Registered Engineer, Guatemala.
- BERTOZZI, DAN, JR. (1974) Business Administration
A.B., University of California, Berkeley, 1966; M.B.A., 1969; J.D., 1971. Professor.
- BETHEL, A. C. W. (1968) Philosophy
B.A., University of California, Santa Barbara, 1964; M.A., 1968; Ph.D., 1974. Professor.
- BEUG, JAMES L. (1973) Computer Science
B.A., Northwestern University, 1962; Sc.M., Ohio State University, 1971; Ph.D., 1974. Professor and Department Chair.
- BEYER, EDGAR H. (1981) Crop Science
B.S., University of Illinois, 1958; M.S., Purdue University, 1963; Ph.D., 1964. Professor.
- BIEZAD, DANIEL J. (1990) Aeronautical Engineering
B.S., Illinois Institute of Technology, 1966; M.S., Air Force Institute of Technology, 1972; Ph.D., Purdue University, 1984. Associate Professor.
- BIGGS, JOSEPH R. (1988) Management
B.S.B.A., Ohio State University, 1968; M.B.A., University of Missouri, Kansas City, 1971; Ph.D., Ohio State University, 1975. Professor.
- BIRD, ALLAN W. (1994) Management
B.A., California State University, Fresno, 1978; M.A., Sophia University, Tokyo, Japan, 1982; Ph.D., University of Oregon, 1988. Associate Professor.
- BISHOP, URSULA (1990) College of Science and Mathematics
B.S., University of Oregon, 1982. Director of Minority Access to Health Careers.
- BLATTNER, ERNEST W. (1983) Mechanical Engineering
M.S., Swiss Federal Institute, Zurich, 1953. Professor. Registered Professional Engineer, Utah.
- BLOCK, DANIEL W. (1983) Agribusiness
B.S., California Polytechnic State University, San Luis Obispo, 1977; M.S., 1987. Associate Professor.
- BLODGET, ROBERT L. (1974) Psychology and Human Development
B.A., Willamette University, 1965; Ed.D., University of Massachusetts, 1973. Associate Professor.
- BLUM, MICHAEL L. (1981) (1984) Graphic Communication
B.A., University of California, Los Angeles, 1971; M.S., Rochester Institute of Technology, 1979. Professor.

- BOCHE, RAYMOND E. (1969) Computer Science
B.S., California State Polytechnic College, 1958; M.S., San Jose State College, 1966; Ph.D., Texas Tech University, 1971. Professor.
- BOMSTAD, LINDA (1994) Philosophy
B.A., University of California, Davis, 1974; M.A., 1976; Ph.D., 1982. Assistant Professor.
- BOONE, JOSEPH C. (1968) Physics
B.A., Earlham College, 1962; M.A., University of Wisconsin, 1967; Ph.D., 1970. Professor.
- BORIN, NORM. A. (1992) Business Administration
B.S., University of California, Davis, 1981; M.B.A., California State University, Sacramento, 1987; Ph.D., University of Virginia, Charlottesville, 1992. Associate Professor.
- BOTWIN, MICHAEL (1981) Architectural Engineering
B.S., University of Miami, 1962; M.S., Rensselaer Polytechnic Institute, 1964; Ph.D., 1968. Professor.
- BOWKER, LESLIE S. (1974) Biological Sciences
B.S., University of Massachusetts, 1963; M.S., Rutgers University, 1965; Ph.D., Washington State University, 1974. Professor.
- BOYER, LISA (1986) Intercollegiate Athletics
B.Journalism, Creighton University, 1983; M.A., Idaho State, 1988. Head Coach.
- BOYNTON, WILLIAM C. (1985) Accounting
B.S., Northeastern University, 1967; M.B.A., Michigan State University, 1968; Ph.D., 1976. Professor. Certified Public Accountant.
- BRADY, LOIS (1988) Computer Science
B.A., Wagner College, 1958; M.S., University of Iowa, 1960; M.S., University of Wisconsin, 1984; Ph.D., 1988. Professor.
- BRADY, MARY L. (1968) University Library
B.A., Mundelein College, 1960; M.A.L.S., Rosary College, 1966; M.A., California Polytechnic State University, San Luis Obispo, 1978. Librarian.
- BRAUNINGER, ANDREA L. (1986) Health Services
A.B., San Jose State College, 1966; M.D., University of Southern California, 1971; Medical Internship, University of Florida, 1972. Physician.
- BREAZEALE, CONNIE R. (1966) Food Science and Nutrition
B.A., California State Polytechnic College, 1960; M.A., 1966. Associate Professor.
- BRECKENRIDGE, PATRICIA HAMER (1975) Ornamental Horticulture
B.S., California State Polytechnic College, 1970; M.L.A., California State Polytechnic University, Pomona, 1979. Additional graduate study, California Polytechnic State University, San Luis Obispo. Professor.
- BREITENBACH, JEROME R. (1986) Electronic and Electrical Engineering
B.S., California State Polytechnic University, Pomona, 1977; M.S., California Institute of Technology, 1978; Ph.D., University of California, Los Angeles, 1983. Professor.
- BREITENBACH, STACEY M. (1981) College of Engineering
B.S., California Polytechnic State University, San Luis Obispo, 1989. Director of Advising Center.
- BREMER, WALTER D. (1981) Landscape Architecture
B.F.A., Mankato State University, 1973; M.L.A., Utah State University, 1977. Professor and Department Head.
- BRODIE, DAVID A. (1970) Architecture
B.Arch., University of Capetown, South Africa, 1953; M.Arch., University of California, Berkeley, 1964. Professor.
- BROWN, C. ANDREA (1987) Physical Education and Kinesiology
Specialist Certificate, University of Birmingham, England, 1968; M.S., Washington State University, 1978; M.A., 1979; Ph.D., University of Idaho, 1984. Associate Professor.
- BROWN, CARL R.V. (1982) English
B.A., Arizona State University, 1971; M.A., 1972; Ph.D., Stanford University, 1977. Professor.
- BROWN, J. WYATT (1990) Crop Science
B.S., Louisiana State University, 1978; M.S., 1985; Ph.D., Cornell University, 1990. Assistant Professor.
- BROWN, JOHANNA B. (1969-1973) (1974) University Library
B.A., Saint Mary's College, 1966; M.L.S., State University of New York at Geneseo, 1967. Associate Librarian.
- BROWN, KENNETH J. (1991) English
B.A., Xavier University of Louisiana, 1971; M.A., University of Iowa, 1975; Ph.D., 1987. Associate Professor.
- BROWN, KENNETH L. (1980) Industrial and Manufacturing Engineering
B.V.E., California Polytechnic State University, San Luis Obispo, 1979; M.A., 1980; Ph.D., Colorado State University, 1988. Associate Professor.
- BROWN, ROBERT J. (1969) Biological Sciences
B.S., California State College, Los Angeles, 1964; M.S., Arizona State University, 1967; Ph.D., University of Toronto, Canada, 1972. Professor.
- BROWN, RONALD F. (1974) Physics
B.A., University of California, Riverside, 1962; M.A., 1964; Ph.D., 1968. Professor.
- BUCCOLA, VICTOR A. (1962) Physical Education and Kinesiology
B.S., California State Polytechnic College, 1956; M.A., 1957; Ed.D., Arizona State University, 1972. Professor.
- BUCKALEW, W. CHRIS (1990) Computer Science
B.S., North Texas State University, 1980; M.S., 1984; Ph.D., 1990. Associate Professor.
- BUFFA, ANTHONY J. (1970) Physics
B.S., Rensselaer Polytechnic Institute, 1964; M.S., University of Illinois, 1966; Ph.D., 1969. Professor.
- BURGUNDER, LEE B. (1983) Business Administration
B.A., Dartmouth College, 1977; M.B.A., Stanford University, 1981; J.D., 1981. Professor.
- BURN, SHAWN (1990) Psychology and Human Development
B.S., Virginia Commonwealth University, 1982; M.A., The Claremont Graduate School, 1984; Ph.D., 1988. Assistant Professor.
- BURRELL, SHEL A. (1973) Career Services
B.A., University of California, San Diego, 1971; M.A., California Polytechnic State University, San Luis Obispo, 1981. Associate Director.
- BURROUGHS, SARAH E. (1967) Food Science and Nutrition
B.S. and Certificate in Medical Technology, University of Michigan, 1956; Ph.D., University of California, 1967. Professor.
- BURT, CHARLES M. (1978) Agricultural Engineering
B.S., California Polytechnic State University, San Luis Obispo, 1973; M.S., Utah State University, 1975; Ph.D., 1983. Professor. Registered Civil Engineer and Agricultural Engineer, California. Registered Professional Engineer, Utah.
- BURTON, KENNETH M. (1976-1979) (1989) Information Systems
B.S., California Polytechnic State University, San Luis Obispo, 1979. Director, Computing Services.
- BURTON, ROBERT E. (1968) History
A.B., San Diego State College, 1962; M.A., University of Oregon, 1964; Ph.D., 1969. Professor and Department Chair.
- BUSSELEN, HARRY J., JR. (1975) Psychology and Human Development
B.S., California State College, Sacramento, 1959; M.S., 1962; Ph.D., Florida State University, 1970; additional graduate study, University of Oregon. Professor.
- BUTLER, J. KENT (1977) Industrial and Manufacturing Engineering
B.S., Arizona State University, 1961; M.S., 1963; Ph.D., 1971. Professor.
- CANO, RAUL J. (1974) Biological Sciences
B.S., Eastern Washington State College, 1970; M.S., 1972; Ph.D., University of Montana, 1974. Professor.
- CANTU, R. DAVID (1980) Student Academic Services
B.S., California State Polytechnic College, 1969; M.S., 1974; M.A., 1975. Director, Minority Engineering Program.
- CARDOZA, MARGARET (1981) Research and Graduate Programs
B.A., California State University, Sacramento, 1972. Director of Grants Development.
- CARNEGIE, E. J. (1963-64) (1965) Agricultural Engineering
B.S., California State Polytechnic College, 1962; M.Engr., University of California, Davis, 1963. Professor and Department Head. Registered Mechanical Engineer, California.

- CARPENTER, THOMAS W. (1968).....Mechanical Engineering
B.S., Virginia Polytechnic Institute, 1961; M.S., 1964; Ph.D., Purdue
University, 1969. Professor.
- CARR, JANICE L. (1983).....Accounting
B.S., California State University, Northridge, 1971; M.S., 1975; Ph.D.,
Arizona State University, 1985. Associate Professor. Certified Public
Accountant.
- CARROLL, ROBERT J. (1993).....University Relations and Development
B.A., University of California, Berkeley, 1984. Director, Corporate and
Foundation Relations.
- CARTER, CLAY (1991).....Journalism
M.J., Carleton University, Ottawa, Canada, 1990. Associate Professor.
- CARTER, LARK P. (1981).....Crop Science
B.S., Iowa State University, 1953; M.S., 1956; Ph.D., 1960. Professor.
- CARTTER, MARLENE A. (1985-88) (1993).....Academic Records
B.A., California State University, Los Angeles, 1976. Associate Director.
- CARY, ARTHUR S. (1974).....Physics
B.A., Fisk University, 1949; M.A., 1951; Ph.D., University of California,
Riverside, 1969. Professor.
- CASEY, GLEN R. (1982).....Agricultural Education
B.S., Chico State College, 1966; M.S., California Polytechnic State
University, San Luis Obispo, 1979; Ed.D., Oklahoma State University,
Stillwater, 1987. Associate Professor and Department Head.
- CASTELLANO-GIRÓN, HERNÁN (1986).....Foreign Languages and Literatures
B.A., University of Chile, 1960; M.A., University of Rome, 1981; Ph.D.,
Wayne State University, 1986. Assistant Professor.
- CAVALETTO, RICHARD A. (1990).....Agricultural Engineering
B.S., California Polytechnic State University, San Luis Obispo, 1981; M.S.,
University of California, Davis, 1983; Ph.D., 1987. Associate Professor.
Registered Mechanical Engineer, California.
- CENSULLO, ALBERT C. (1974).....Chemistry
B.S., Villanova University, 1969; Ph.D., Pennsylvania State University,
1975. Professor.
- CERF, DOUGLAS C. (1990).....Accounting
B.S., University of California, Berkeley, 1978; M.B.A., Golden Gate
University, 1982; M.A., University of California, Davis, 1987; Ph.D., 1991.
Associate Professor. Certified Public Accountant.
- CHAPMAN, ARTHUR J. (1972).....Architecture
B.S., B.Arch., California State Polytechnic College, 1970; M.S., Pennsylvania
State University, 1971; additional graduate study, University of California,
Los Angeles. Professor.
- CHATZIOANOU, ALYPIOS E. (1992).....Civil and Environmental Engineering
B.S., Athens Polytechnic, 1980; M.S., University of California, Berkeley,
1982; Ph.D., 1984. Assistant Professor. Registered Professional Engineer,
Greece.
- CHEDA, ARCHIE D. (1980).....Industrial and Manufacturing Engineering
B.S., California State Polytechnic College, 1969; M.S., University of
Minnesota, 1978; M.S., University of California, Santa Barbara, 1988.
Professor. Registered Professional Engineer, California.
- CHEEK, DONALD K. (1973).....University Center for Teacher Education
B.S., Seton Hall University, 1953; M.S.W., Fordham School of Social
Service, 1955; Ph.D., Temple University, 1971. Professor.
- CHEP, KENNETH (1990).....Student Academic Services
B.S., Madison College, Virginia, 1976; M.Ed., George Mason University,
Virginia, 1981; Ed.S., James Madison University, Virginia, 1985. Learning
Disabilities Specialist, Disabled Student Services.
- CHEW, MARIE (1976).....Health Services
R.N., St. Joseph College, Maryland; 1959; B.S., 1959. N.P., Brigham Young
University, 1981. ANA Board Certificate, 1983. Nurse Practitioner.
- CHILDERS-KRAFT, SUSAN E. (1988).....University Relations and Development
B.S., California Polytechnic State University, San Luis Obispo, 1976; M.A.,
Mills College, 1978. Director, Major Gifts.
- CHIPPING, DAVID H. (1971).....Physics
B.S., Cambridge University, England, 1965; M.S., Stanford University, 1967;
Ph.D., 1970. Professor.
- CHIRICA, LAURIAN M. (1984).....Computer Science
M.S., University of Bucharest, Romania, 1964; Ph.D., University of
California, Los Angeles, 1976. Professor.
- CHIVENS, DONALD R. (1988).....Mechanical Engineering
B.S., California Institute of Technology, 1965; M.S., 1966; Ph.D., Arizona
State University, 1974. Associate Professor.
- CHRISTENSEN, MARGARET M., MAJ. (1989).....Military Science
B.A., Concordia College, 1969; M.A., University of Utah, 1973.
- CHRISTENSON, ROBERT A. (1970).....Psychology and Human Development
B.S., University of Utah, 1963; M.S., Brigham Young University, 1968;
Ph.D., 1970. Professor.
- CHUN, EDNA (1993).....Administration and Finance
B.A., Oberlin College, 1968; M.A., Columbia University, 1971; D.M.
Indiana University, 1982. Director, Human Resources.
- CIANO, DAVID A. (1973).....Financial Aid
B.A., University of Redlands, 1966; J.D., University of California, Los
Angeles, 1972. Counselor.
- CICHOWSKI, ROBERT S. (1971).....Chemistry
B.S., Purdue University, 1964; Ph.D., Alfred University, 1968. Professor and
Coordinator, Liberal Studies.
- CIESIELSKI, BARBARA F. (1962).....Information Systems
B.A., Fresno State University, 1962. Telephone Administration Coordinator,
Communications Services.
- CIRONE, JOAN M. (1971).....Health Services
R.N., Cuesta College, 1971; Nurse Practitioner, University of California, Los
Angeles, 1974; B.S.N., California State College, Bakersfield, 1979; M.A.,
California Polytechnic State University, San Luis Obispo, 1983; M.P.A.,
University of San Francisco, 1983. Head, Nursing Services.
- CIROVIC, MICHAEL M. (1968).....Electronic and Electrical Engineering
B.E., New York University, 1965; M.S., 1968. Professor.
- CLARK, KEVIN (1988).....English
B.A., University of Florida, 1972; M.A., 1979; Ph.D., University of
California, Davis, 1986. Associate Professor.
- CLARK, NANCY L. (1989).....History
B.A., University of California, Los Angeles, 1972; M.A., 1974; M.A., Yale
University, 1982; M.Phil., 1983; Ph.D., 1988. Assistant Professor.
- CLARK, WILLIAM E. (1977).....Mechanical Engineering
B.M.E., University of Minnesota, 1964; M.S., 1966; Ph.D., 1972. Professor.
Registered Professional Engineer, California.
- CLAUSE, ODILE M. (1976).....Foreign Languages and Literatures
B.A., University of Wyoming, 1967; M.A., 1968; Ph.D., University of
Colorado, 1975. Professor.
- CLENDENEN, HARRIET (1977).....Student Academic Services
B.A., Central Michigan State University, 1953; M.A., California Polytechnic
State University, San Luis Obispo, 1979. Coordinator, Disabled Student
Services.
- CLIFFORD, CAROL F. (1981).....Administration and Finance
B.S., University of Washington, 1972. Assistant Director, Fiscal Services-
Payroll.
- CLOVER, ROBERT C. (1990).....Information Systems
B.A., University of California, Berkeley, 1967; M.A., Chico State College,
1969; Ph.D., Oregon State University, 1974. Director, Academic Computing
Services.
- COCHRAN, BURT, JR. (1976).....Health Services
M.D., University of Southern California Medical School, 1949. Certified
American Board of Internal Medicine, 1957. Physician. Head, Medical
Services.
- COCHRANE, MONA (1970).....Health Services
R.N., Knapp College of Nursing, Santa Barbara, 1953. N.P., California
Polytechnic State University, San Luis Obispo, 1976. Nurse Practitioner.
- COLEMAN, JAMES W. (1973).....Social Sciences
B.A., California State University, Northridge, 1969; M.A., University of
California, Santa Barbara, 1971; Ph.D., 1975. Professor.

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- COLEMAN, WILLI M. (1980) Ethnic Studies
B.A., San Francisco State College, 1966; M.S.W., University of California, Berkeley, 1971; Ph.D., University of California, Irvine, 1982. Associate Professor.
- COLOME, JAIME S. (1972) Biological Sciences
B.A., University of California, Santa Barbara, 1966; M.A., 1973; Ph.D., 1974. Professor.
- COLVIN, MICHAEL R. (1979) Mathematics
B.A., University of Houston, 1968; M.A., 1970; Ph.D., 1976. Professor.
- CONNELLY, JOHN B. (1970) Computer Science
B.A., University of Southern California, 1958; M.S., Oregon State University, 1988; Ph.D., University of Southern California, 1970. Professor.
- CONWAY, JAMES R. (1969) Speech Communication
B.A., California State College, Los Angeles, 1966; M.A., 1968; Ph.D., University of Southern California, 1977. Professor.
- COOK, BARBARA E. (1972) Social Sciences
A.B., Duke University, 1965; M.A., Stanford University, 1967; Ph.D., 1974. Associate Professor.
- COOK, GAYLE (1991) Physics
B.Sc., Imperial College, London, 1973; M.S., University of Colorado, 1977; Ph.D., 1982. Associate Professor.
- COOKE, SCOTT (1980) Administration and Finance
B.S., California Polytechnic State University, San Luis Obispo, 1985. Assistant Director, Fiscal Services-Financial Reporting.
- COOMBS, LEE C. (1969) Chemistry
B.A., San Diego State College, 1963; M.S., 1965; Ph.D., Purdue University, 1970. Professor.
- COOPER, ALAN F. (1970) Biological Sciences
B.S., California State Polytechnic College, Pomona, 1964; Ph.D., University of California, Riverside, 1969. Professor and Director.
- COOPER, ALLAN R. (1975) Architecture
B.A., Rice University, 1967; B.Arch., 1968; M.Arch., Cornell University, 1971. Professor. Registered Architect, California.
- COOPER, MARK A. (1978) Industrial and Manufacturing Engineering
B.S., California State Polytechnic College, 1968; M.S., Arizona State University, 1978. Professor.
- CORNELL, RICHARD J. (1993) Health Services
Pharmacy D., University of California, San Francisco, 1965. Pharmacist.
- COOPER, MARY P. (POLLY) (1974) Architecture
B.A., Wellesley College, 1963; M.Ed., Harvard University, 1964; M.Arch., University of California, Berkeley, 1971; M.L.A., 1974. Professor. Registered Architect, California.
- CORTEZ, SAMUEL (1990) Student Academic Services
B.A., California Polytechnic State University, San Luis Obispo, 1992. Director, Upward Bound.
- COTA, HAROLD M. (1966) Civil and Environmental Engineering
B.S., University of California, Berkeley, 1959; M.S., Northwestern University, 1960; Ph.D., University of Oklahoma, 1966. Professor. Registered Professional Engineer, California; Diplomat of the Academy of Environmental Engineers.
- COTKIN, GEORGE B. (1980) History
B.A., Brooklyn College (C.U.N.Y.), 1972; M.A., Ohio State University, 1974; Ph.D., 1978. Professor.
- COWELL, LENNIS (1985) Intercollegiate Athletics
B.Sc., California Polytechnic State University, San Luis Obispo, 1971; M.A., 1972. Head Coach.
- CRABB, A. CHARLES (1978) Academic Affairs
B.S., University of California, Davis, 1973; M.S., Bowling Green State University, 1974; Ph.D., University of California, Davis, 1991. Associate Vice President for Academic Resources and Professor.
- CRAWFORD, TERRY (1992) Intercollegiate Athletics
B.S., University of Tennessee, 1970; M.S., 1972. Head Coach.
- CRUIKSHANKS, RANDAL L. (1972) Political Science
B.A., University of California, Berkeley, 1963; M.A., University of Oregon, 1965; Ph.D., 1968; additional graduate study, University of Michigan. Professor.
- CULVER, JOHN H. (1975) Political Science
B.S., University of Oregon, 1968; M.S., 1970; Ph.D., University of New Mexico, 1975. Professor.
- CUMMINGS, CRAIG (1983) Intercollegiate Athletics
B.Sc., California Polytechnic State University, San Luis Obispo, 1981; M.A., 1987. Head Coach.
- CUMMINGS, RUSSELL M. (1986) Aeronautical Engineering
B.S., California Polytechnic State University, 1977; M.Eng., 1985; Ph.D., University of Southern California, 1988. Professor and Department Chair.
- CUNICO, GERALD E. (1988) Industrial Technology
B.S., University of New Mexico, 1964; M.S., 1968; Ed.D., Utah State University, 1973. Professor.
- CURRIER, BETH (1981) Student Academic Services
B.A., University of California, Los Angeles, 1966; M.A., California Polytechnic State University, San Luis Obispo, 1980. Reader/Access Facilitator, Disabled Student Services.
- CURRIER, SUSAN (1980) English
A.B., Mount Holyoke College, 1969; M.A., University of Massachusetts, 1973; Ph.D., 1979. Professor.
- D'ALBRO, JAMES A. (1969) Ornamental Horticulture
B.S., Cornell University, 1966; M.S., University of California, Davis, 1969; Ph.D., Michigan State University, 1980. Professor.
- DALTON, LINDA C. (1983) City and Regional Planning
A.B., Radcliffe/Harvard, 1967; M.U.P., University of Washington, 1974; Ph.D., 1978. Professor and Department Head.
- DALY, JAMES C. (1972) Statistics
B.S., Gonzaga University, 1966; Ph.D., Oregon State University, 1973. Professor.
- DANA, CHARLES H. (1982) Computer Science
B.A., University of California, Santa Barbara, 1972; M.S., 1974; Ph.D., 1981. Professor.
- DANES, JEFFREY E. (1986) Business Administration
B.A., San Jose State University, 1972; M.A., 1974; Ph.D., Michigan State University, 1976. Professor.
- DATTA, SAMIR KUMAR (1968) Electronic and Electrical Engineering
B.E.E., Jadavpur University, Calcutta, India, 1958; M.S., University of Manchester, England, 1963; Ph.D., 1966. Professor.
- DAUFFENBACH, MARILYN (1979) Health Services
R.N., DeAnza Community College, 1973; F.N.P. Stanford University, 1990. Nurse Practitioner.
- DAUGHERTY, M. STEVEN (1988) Animal Science
B.S., New Mexico State University, 1977; M.S., Colorado State University, 1979; Ph.D., New Mexico State University, 1984. Assistant Professor.
- DAVIDMAN, LEONARD (1977) University Center for Teacher Education
B.A., Brooklyn College, 1966; M.A., 1972; Ph.D., Stanford University, 1976. Professor.
- DAVIDMAN, PATRICIA (1992) University Center for Teacher Education
B.A., Brooklyn College, 1968; M.A., Stanford University, 1975; Ph.D., University of California, Santa Barbara, 1992. Assistant Professor.
- DAVIDSON, OTTO C. (1968) Mechanical Engineering
B.S., Bucknell University, 1955; M.S., Massachusetts Institute of Technology, 1956; Ph.D., Stanford University, 1960. Professor. Registered Professional Engineer, California.
- DAVIES, THOMAS H. (1983) Music
B.M.E., Bowling Green State University, 1975; M.A., 1977; D.M.A., University of Southern California, 1983. Professor.
- DAVIS, DONNA (1984) Career Services
B.A., California Polytechnic State University, San Luis Obispo, 1976; M.A., 1977. Career Counselor.
- DAVIS, M. LeROY (1976) Agribusiness
B.S., California State Polytechnic College, 1966; M.S., Iowa State University, 1968; Ph.D., Colorado State University, 1973. Professor and Department Head.
- DAVIS, MARJORIE A. (1976) Health Services
B.S., University of Oklahoma, 1956; C.L.T., M.T., A.S.C.P., P.H. Microbiologist. Clinical Laboratory Technologist.
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- DAVIS, STEVEN C. (1987).....Physical Education and Kinesiology
B.S., University of California, Davis, 1979; M.S., San Diego State University,
1983; Ph.D., Pennsylvania State University, 1986. Associate Professor.
- DAWSON, MADOKA (1993)..... Food Science and Nutrition
B.S., Illinois State University, 1982; M.S., 1983; Ed.D., Pepperdine
University, 1991. Assistant Professor. Registered Dietitian.
- DAY, LINDA L. (1993).....City and Regional Planning
B.S., SUNY-Brockport, 1964; B.S.Arch, Minnesota, 1989; M.Arch/Urban
Design, University of Wisconsin, Madison, 1992; Ph.D., Syracuse, 1970.
Associate Professor.
- DeJONG, ALVIN A. (1974).....Biological Sciences
B.S., Seattle Pacific College, 1965; Ph.D., Washington State University,
1972. Professor.
- DeKLEINE, GLORIA J. (1983)..... Health Services
B.A., Western Michigan University, 1964; School of Medical Technology,
Borgess Hospital, 1965. M.T., A.S.C.P., California Licensed Clinical
Laboratory Technologist. Clinical Laboratory Technologist.
- DeKLEINE, H. ARTHUR (1974).....Mathematics
B.S., Western Michigan University, 1964; M.A., 1965; Ph.D., University of
California, Riverside, 1968. Professor.
- DELANY, JAMES E. (1970).....Mathematics
A.B., San Diego State College, 1961; Ph.D., Iowa State University, 1966.
Professor.
- DeLEY, WARREN W. (1971).....Social Sciences
A.B., Stanford University, 1956; M.A., 1957; M.A., University of California,
Los Angeles, 1963; C. Phil., 1968; Ph.D., 1970. Professor.
- DeMERS, GERALD (1989).....Physical Education and Kinesiology
B.S., Mankato State College, 1971; M.S., 1972; Ph.D., University of Utah,
1979. Associate Professor.
- DeNATALE, JAY S. (1988)..... Civil and Environmental Engineering
B.S., University of California, Davis, 1977; M.S., 1979; Ph.D., 1983.
Professor.
- DENEL, M. BILGI (1981)..... Architecture
B.S.C.E., Robert College, Istanbul, 1959; M.F.A., Princeton University,
1963; Ph.D., Istanbul Technical University, 1981. Professor. Registered Civil
Engineer and Architect, Turkey.
- DENEL, SERIM (1983)..... Architecture
B.Arch., Middle East Technical University, Turkey, 1962; M.Arch., 1963;
M.S., Pratt Institute, 1964; Ph.D., Istanbul Technical University, 1982.
Professor. Registered Architect, Turkey.
- DENSHAM, ROBERT S. (1980).....Art and Design
B.A., California State College, Long Beach, 1967; M.F.A., California State
University, Long Beach, 1980. Professor.
- DETREE, JOANNE (1991)..... University Foundation
B.S., California Polytechnic State University, San Luis Obispo, 1987. Interim
Human Resources Manager.
- DETTLOFF, ERLAND G. (1967)..... University Center for Teacher Education
B.S., Minot State College, 1956; M.A., University of Wyoming, 1962; Ed.D.,
1963. Professor.
- DEVORE, JAY L. (1977)..... Statistics
B.S., University of California, Berkeley, 1966; M.S., Stanford University,
1968; Ph.D., 1971; additional graduate study, Sheffield University, England.
Professor.
- DIAZ, JOE V. (1976).....Psychological Services
B.A., University of Arizona, 1970; M.Ed., 1971; Ph.D., 1976. Counselor.
- DICKERSON, ROBERT H. (1970)..... Physics
B.S., University of Arizona, 1959; M.S., 1963; Ph.D., 1964. Professor and
Department Chair.
- DIETTERICK, BRIAN C. (1994)..... Natural Resources Management
B.A., University of Pennsylvania, 1980; M.S., University of Arizona, 1982;
Ph.D., Penn State University, 1994. Assistant Professor.
- DIGNAN, ROBERT J. (1974)..... Administration and Finance
B.S., Northeastern University, 1966; M.B.A., Golden Gate College, 1970.
Director, Fiscal Services.
- DILLS, KEITH W. (1983).....Art and Design
B.A., State University of Iowa, 1961; M.A., San Francisco State College,
1969; Ph.D., University of California, Berkeley, 1981. Professor.
- DIMMITT, LAURA SAENZ (1975)..... Financial Aid
B.A., University of California, Santa Barbara, 1971; M.A., California
Polytechnic State University, San Luis Obispo, 1980. Scholarship Program
Manager.
- DINGUS, DELMAR D. (1973)..... Soil Science
B.S., Berea College, 1966; M.S., West Virginia University, 1968; Ph.D.,
Oregon State University, 1973. Professor.
- DIRKES, LOIS M. (1973).....Psychological Services
B.S., University of California, Los Angeles, 1958; M.S., University of
Maryland, 1963; Ph.D., 1973. Professor and Counselor.
- DOBSON, JOHN (1990).....Business Administration
B.A., University of Lancaster, England, 1979; M.A., University of South
Carolina, 1981; Ph.D., 1988. Associate Professor.
- DOMINGUES, ANTHONY (1985)..... Admissions
B.S., California Polytechnic State University, San Luis Obispo, 1979. Senior
Admissions Officer.
- DOMPKE, JOANNE (1982)..... Health Services
R.N., Cuesta College, 1976; N.P., University of California,, Davis, 1986.
Nurse Practitioner.
- DONALDSON, DOUGLAS D. (1968).....Biological Sciences
A.B., University of California, Berkeley, 1962; M.A., California State
College, Los Angeles, 1964; Ph.D., Oklahoma State University, 1969.
Professor.
- DONNELL, ROSEMARY T. (1977)..... Health Services
R.N., St. Anthony's School of Nursing, Oklahoma, 1967; N.P., California
State University, Los Angeles, 1976; B.S., California Polytechnic State
University, San Luis Obispo, 1992. Nurse Practitioner.
- DOUB, PHILLIP M. (1985)..... College of Agriculture,
Agribusiness, and Animal Science
B.S., California State Polytechnic College, 1966; M.B.A., College of William
and Mary, 1971. Professor and Director of Farm Systems.
- DOYLE, ELAINE M. RAMOS (1972-73) (1976)..... Institutional Studies
B.S., California Polytechnic State University, San Luis Obispo, 1981; M.A.,
1994. Director.
- DRUCKER, HOWARD (1980)..... University Center for Teacher Education
B.A., Hunter College of the City of New York, 1957; M.A., 1961; Ph.D.,
Florida State University, 1972. Professor.
- DUARTE, ARTHUR C. (1965)..... Agribusiness
B.S., California State Polytechnic College, 1964; M.S., Oregon State
University, 1965; Ph.D., Washington State University, 1975. Professor.
- DUBBINK, DAVID T. (1989).....City and Regional Planning
B.F.A., University of Illinois, Urbana-Champaign, 1960; M.C.P., University
of California, Berkeley, 1965; Ph.D., University of California, Los Angeles,
1983. Associate Professor.
- DUERK, DONNA (1981)..... Architecture
B.Arch., North Carolina State University, 1971; B.A., 1972; M.Arch.A.S.,
Massachusetts Institute of Technology, 1980. Professor. Registered Architect,
Texas.
- DUFFY, BERNARD K. (1988).....Speech Communication
B.A., San Jose State College, 1970; M.A., 1971; Ph.D., University of
Pittsburgh, 1976. Professor.
- DUFFY, D. JAN (1980).....Business Administration
B.A., Stanford University, 1972; J.D., Case Western Reserve University,
1976. Professor.
- DUFFY, SUSAN (1988).....Speech Communication
B.A., Seton Hill College, 1973; M.A., University of Pittsburgh, 1974; Ph.D.,
1979. Professor.
- DWYER, GARY COLBURN (1973)..... Landscape Architecture
B.F.A. and B.L.A., Syracuse University, 1967; B.S.L.A., New York State
University, 1967; M.A., University of Denver, 1970. Professor.
- EARLY, MARK M., MAJ. (1987).....Military Science
B.A., Trinity University, 1975; M.A., Webster University, 1987.

- EATOUGH, NORMAN L. (1968)..... Chemistry
B.S., Brigham Young University, 1957; B.E.S., 1958; M.S., 1959;
M.S.Ch.E., University of Washington, 1960; Ph.D., Brigham Young
University, 1968. Professor.
- EDMISTEN, JOHN W. (1968)..... Architectural Engineering
B.S., California State Polytechnic College, 1965; M.Engr., University of
California, Berkeley, 1967. Professor. Registered Civil Engineer, California;
Registered Architect, California.
- EHRENBERG, JAMES R. (1977)..... Engineering Technology
B.S., Gonzaga University, 1960; M.S., Seattle University, 1969; Ed.D.,
Brigham Young University, 1982. Professor. Registered Professional Engineer,
California.
- ELFRINK, T. LEIGH (1980)..... Administration and Finance
B.A., California Polytechnic State University, San Luis Obispo, 1978.
Manager, Administrative Services.
- ELIJAH, MATHEWS M. (1980)..... Administration and Finance
B.S., California Polytechnic State University, San Luis Obispo, 1984; M.S.,
1990. Supervising Custodian.
- ELIMIMIAN, ISAAC (1992)..... English
B.A., Lagos University, 1969; M.A., Texas Christian University, 1974;
Ph.D., Howard University, 1978. Assistant Professor.
- ELLIS, REBECCA (1987)..... Management
B.A., University of Wisconsin, Madison, 1969; M.A., 1971; M.S., 1981;
Ph.D. 1984. Associate Professor.
- ELTZROTH, THOMAS E. (1967)..... Ornamental Horticulture
B.S., Ohio State University, 1965; M.S., 1966. Professor.
- ENDRES, LELAND S. (1969)..... Chemistry
A.B., Middlebury College, 1958; M.A., University of Oregon, 1963; Ph.D.,
University of Arizona, 1966. Professor.
- ENGLE, PATRICE L. (1980)..... Psychology and Human Development
B.A. Wellesley College, 1966; Ph.D., Stanford University, 1971. Professor
and Department Chair.
- ENGLUND, DAVID L. (1973)..... Psychology and Human Development
B.A., Ohio State University, 1956; M.A., University of Hawaii, 1965; Ph.D.,
University of Wisconsin, 1969. Professor.
- EPSTEIN, GARY M. (1969)..... Mathematics
B.A., University of California, Riverside, 1964; Ph.D., 1969. Professor.
- EQUINOIA, RICHARD M. (1973)..... Career Services
B.S., California State Polytechnic College, San Luis Obispo, 1967; M.S.,
1970. Director.
- ESTES, ANGELA M. (1987)..... English
B.A., Washington State University, 1973; M.A., University of Oregon, 1978;
Ph.D., 1985. Associate Professor.
- FABRICIUS, EUGENE DAVID (1970)..... Electronic and Electrical Engineering
B.S., Missouri School of Mines, Rolla, 1956; M.S., 1958; D.Sc., Newark
College of Engineering, New Jersey, 1968. Professor.
- FAHS, MICHAEL L. (1983)..... Speech Communication
A.B., California State University, Long Beach, 1972; M.A., University of
Southern California, 1974; Ph.D., 1976. Professor.
- FANCHON, PHILLIP (1991)..... Economics
D.U.E.S. University of Paris, 1969; B.A., University of California, Santa
Barbara, 1972; M.A., 1975; M.A., 1978; Ph.D., 1982. Assistant Professor.
- FARKYE, NANA Y. (1990)..... Dairy Science
B.Sc., University of Ghana, 1980; M.S., Utah State University, 1985; Ph.D.,
1986. Research Scientist.
- FARRELL, GERALD P. (1970)..... Mathematics
A.B., San Diego State College, 1961; M.S., 1963; Ph.D., University of
California, Los Angeles, 1968. Professor.
- FARUQUE, OMAR (1989)..... Landscape Architecture
B.S.L.A., Texas A & M University, 1971; M. Arch., 1972. Professor.
Registered Architect and Landscape Architect.
- FELDMAN, JACOB (1971)..... Architectural Engineering
B.S., University of Delaware, 1961; M.S., 1968. Professor. Registered Civil
Engineer, California.
- FERREIRA, LESLIE S. (1978)..... Dairy Science
B.S., California State Polytechnic College, 1970; M.S., University of Illinois,
1972; Ph.D., Utah State University, 1980. Professor.
- FETZER, PHILIP L. (1988)..... Political Science
A.B., Princeton University, 1965; M.A.T., Reed College, 1970; Ph.D.,
University of Oregon, 1981. Associate Professor.
- FIELD, GARY G. (1984)..... Graphic Communication
Certificate of Printing, Melbourne College of Printing and Graphic Arts,
Australia, 1966; Diploma in Printing Technology, Trent Polytechnic,
England, 1970; M.B.A., University of Pittsburgh, 1975. Professor.
- FIERTINE, HARRY L. (1966)..... Biological Sciences
B.S., Long Beach State College, 1957; M.A., University of California, Los
Angeles, 1961; Ph.D., 1965. Professor.
- FIORITO, BASIL A. (1977)..... Psychology and Human Development
B.A., Marist College, 1968; M.S., New York University, 1970; M.A., 1975;
Ph.D., Syracuse University, 1977. Professor. Licensed Marriage, Family and
Child Counselor, California.
- FIRMAN, RICHARD (1987)..... Intercollegiate Athletics
B.Sc., California State College, Bakersfield, 1986. Head Coach.
- FISHER, GENE (1991)..... Computer Science
B.S., University of California, Irvine, 1973; Ph.D., 1985. Associate
Professor.
- FLANAGAN, JAMES ROBERT (1959)..... Animal Science
B.S., California State Polytechnic College, 1959; M.S., 1974. Professor.
- FLEISHON, NEIL L. (1985)..... Physics
S.B., Massachusetts Institute of Technology, 1973; M.A., University of
California, Berkeley, 1975; Ph.D., 1979. Professor.
- FLORES, ROBERT A. (1983)..... Agricultural Education
B.S., California Polytechnic State University, San Luis Obispo, 1977; M.S.,
Texas A & M University, 1978; Ph.D., 1989. Associate Professor.
- FLOYD, BARRY (1990)..... Management
B.S., Michigan State University, 1973; M.S., 1974; M.B.A., University of
Michigan, 1983; Ph.D., 1985. Associate Professor.
- FLOYD, DONALD R. (1974)..... Social Sciences
B.A., University of California, Berkeley, 1967; M.A., 1968; Ph.D., 1976.
Professor.
- FORD, SUSAN (1990)..... Student Academic Services
B.A., Mills College, Oakland; M.A., Antioch University, 1982. Program
Coordinator/Academic Advisor, Student Support Services.
- FORGENG, WILLIAM D. (1980)..... Materials Engineering
B.Met.E., Cornell University, 1958; Ph.D., Purdue University, 1962.
Professor.
- FOROOHAR, MANZAR (1987)..... History
B.A., National University of Iran; M.A., California State University,
Northridge, 1973; C. Phil., University of California, Los Angeles, 1978;
Ph.D., 1984. Associate Professor.
- FOSTER, THEODORE C. (1970)..... Physics
B.S., University of Santa Clara, 1961; M.S., University of Washington, 1963;
Ph.D., 1965. Professor.
- FOUNTAIN, H. PAUL (1965)..... Crop Science
B.S., California State Polytechnic College, 1963; M.S., University of
California, Davis, 1974. Professor.
- FRANKEL, RICHARD B. (1988)..... Physics
B.S., University of Missouri, 1961; Ph.D., University of California, Berkeley,
1965. Professor.
- FRAYNE, COLETTE (1992)..... Management
B.S., University of Delaware, 1980; M.B.A., University of San Diego, 1981;
Ph.D., University of Washington, 1986. Associate Professor.
- FREBERG, LAURA A. (1987)..... Psychology and Human Development
B.A., University of California, Los Angeles, 1974; M.A., 1975; Ph.D., 1979.
Associate Professor.
- FREEMAN, CAROL A. (1985)..... Health Services
B.A., Aurora University, 1978; R.N., Ventura College, 1982; N.P., Family
Practice, University of California, Davis, 1989. Nurse Practitioner.

- FREEMAN, H. JO ANNE (1974) Industrial and Manufacturing Engineering
B.I.E., Georgia Institute of Technology, 1966; M.S., University of Southern
California, 1974; Ph.D., Stanford University, 1982. Professor and
Department Chair. Registered Professional Engineer, California.
- FREY, DENNIS F. (1970) Biological Sciences
B.S., Oklahoma State University, 1963; M.S., Virginia State College, 1967;
Ph.D., Oklahoma State University, 1970. Professor.
- FREY, THOMAS G. (1970) Chemistry
B.A., University of Oregon, 1965; Ph.D., University of Idaho, 1970.
Professor.
- FRIEDMAN, FRED S. (1975) Engineering Technology
B.S., University of California, Santa Barbara, 1969; M.S., Loyola University,
Los Angeles, 1972. Professor. Registered Professional Engineer, California.
- FRIEDMAN, MARCIA A. (1973) Academic Records
B.S., California Polytechnic State University, San Luis Obispo, 1984. Systems
Analyst.
- FRISCH, SHERYL (1990) Art and Design
B.A., University of California, Riverside, 1983; M.A., 1988. Slide Curator.
- FRITZ, SUZANNE (1992) Residential Life and Education
B.S., University of California, Davis, 1985; M.Ed., University of Vermont,
1987. Leadership Development Specialist.
- FRYER, ANN (1983) Student Academic Services
B.A., University of San Francisco, 1972; M.A., California Polytechnic State
University, San Luis Obispo, 1983. Learning Disabilities Specialist, Disabled
Student Services.
- FUJITANI, SHARON H. (1977) University Library
B.A., University of California, Santa Barbara, 1963; M.L.S., University of
Hawaii, 1974; M.A., Pepperdine University, 1976. Senior Assistant
Librarian.
- GAINES, MERRILL C. (1976) Architecture
B.A., University of Wisconsin, Milwaukee, 1965; M.Arch. 1973.
Professor. Registered Architect: California, Wisconsin. NCARB Certificate.
- GALLAGHER, MELISSA G. (1978) Health Services
B.S., California State Polytechnic College, 1970; R.N., Cuesta College, 1972;
N.P. Family Planning Nurse Practitioner Program, Campbell, 1987. Nurse
Practitioner.
- GAMBLE, LYNNE E. (1976) University Library
B.A., University of Texas at Austin, 1968; M.L.S., 1969; M.A., California
Polytechnic State University, San Luis Obispo, 1979. Associate Librarian.
- GAMBS, ROGER D. (1974) Biological Sciences
B.S., University of Idaho, 1963; M.S., 1965; Ph.D., University of Montana,
1973. Professor.
- GARNER, EDWARD R. (1967) Mechanical Engineering
B.S., Bradley University, 1962; M.S., University of Arizona, 1965; Ph.D.,
Montana State University, 1973. Professor.
- GARRETT, SOL M., III, LT. COL. (1987) Military Science
B.S., University of Arkansas, 1967; M.S., Boston University, 1980.
Department Head.
- GASCOIGNE, HAROLD E. (1984) Mechanical Engineering
B.S.M.E., University of Kansas, 1957; M.S.E., University of Michigan, 1959;
Ph.D., 1968. Professor. Registered Professional Engineer, Utah.
- GAY, LARRY W. (1979) Industrial Technology
B.A., California Polytechnic State University, San Luis Obispo, 1975; M.A.,
1976; Ed.D., Brigham Young University, 1980. Professor. Licensed General
Contractor.
- GENEREUX, DOUGLAS G. (1970) Agribusiness
B.S., University of Nebraska, 1964; M.S., 1969; Ph.D., Colorado State
University, 1979. Professor.
- GEOGHAGEN, LOCKSLEY (1977) Student Life and Activities
B.A., University of California, Los Angeles, 1970; M.A., California
Polytechnic State University, San Luis Obispo, 1976; A.B.D., University of
California, Santa Barbara; additional graduate study. Associate Director.
- GEORGE, DAVID L. (1970) Political Science
A.B., San Diego State College, 1962; M.A., 1968; Ph.D., University of
Oregon, 1970; additional graduate study, Yale University, University of
Michigan Survey Research Center. Professor.
- GERINGER, J. MICHAEL (1992) Management
B.S., Indiana University, 1980; M.B.A., University of Washington, 1983;
Ph.D., 1986. Associate Professor.
- GILLHAM, JOHN F. (1975) Landscape Architecture
B.L.A., University of Oregon, 1962; M.L.A., 1966. Professor.
- GILLIS, WILLIAM T. (1987) Dairy Science
B.S., Mississippi State University, 1973; M.S., 1975; Ph.D., 1979. Associate
Professor.
- GIROLO, JACK E. (1970) Mathematics
B.A., San Jose State College, 1964; M.S., Iowa State University, 1966;
Ph.D., 1971. Professor.
- GISH, ROBERT F. (1992) Ethnic Studies
B.A., University of New Mexico, 1962; M.A., 1967; Ph.D., 1972. Professor
and Director, Ethnic Studies.
- GITTES, KATHARINE SLATER (1983) English
B.A., University of California, San Diego, 1972; M.A., San Diego State
University, 1975; M.A., University of California, San Diego, 1981; Ph.D.,
1983. Professor.
- GLASS, L. JOE (1970) Agricultural Engineering
B.S., Purdue University, 1962; M.S., Texas A & M University, 1965; Ph.D.,
1971. Professor. Registered Civil Engineer, California.
- GLASSCO, D. EDWARD (1968) Mathematics
B.S., Harvey Mudd College, 1963; M.A., University of Southern California,
1966; Ph.D., 1971. Professor.
- GLASSMEYER, SONJA M. (1979) Physical Education and Kinesiology
B.S., California Polytechnic State University, San Luis Obispo, 1973; M.S.,
1974; Ed.D., Brigham Young University, 1981. Professor.
- GLOSTER, ARTHUR S. II (1986) Information Systems
B.S., University of Tennessee, 1961; M.S., 1963; Ed.S., 1966; Ed.D.,
Virginia Institute and State University, 1974. Vice President.
- GODFREY, MARY F. (1992) English
B.A., George Washington University, 1978; B.S.N., Thomas Jefferson
University, 1982; Ph.D., Princeton University, 1992. Assistant Professor.
- GOERS, JOHN W. F. (1980) Chemistry
B.S., University of Illinois, 1969; Ph.D., University of California, Los
Angeles, 1974. Professor.
- GOLDBERG, SAUL (1970) Electronic and Electrical Engineering
B.S., Fairleigh Dickinson University, 1963; M.E., University of Florida, 1964;
Ph.D., 1968. Professor and Department Chair.
- GOLDENBERG, STUART (1970) Mathematics
B.S., University of California, Los Angeles, 1965; M.S., University of
California, Riverside, 1969; Ph.D., 1970. Professor.
- GOODEN, REGINALD H., JR. (1970) Political Science
B.A., University of California, Los Angeles, 1962; M.A., University of
California, Santa Barbara, 1969; Ph.D., 1972. Professor.
- GORDON, RAYMOND G. (1967) Mechanical Engineering
B.S., Western New England College, 1966; M.S., University of Michigan,
1967; Ph.D., University of California, Santa Barbara, 1974. Professor.
Registered Professional Engineer, California.
- GOWGANI, GEORGE G. (1970) Crop Science
B.S., California State Polytechnic College, San Luis Obispo, 1964; M.A.,
1968; M.S., University of Nevada, 1972; Ph.D., 1975. Professor and
Department Head.
- GRADY, DAVID V. (1971) Biological Sciences
A.B., University of California, Los Angeles, 1964; Ph.D., 1974. Professor.
- GRAHAM, JOAN P. (1978) Administration and Finance
B.A., Central Washington University, 1971. Administrative Services Manager,
Public Safety Services.
- GRANNEMAN, GARY A. (1978) Engineering Technology
B.S., Iowa State University, 1962; M.S., 1972; Ph.D., 1978. Professor.
Registered Professional Engineer, Iowa.
- GRANT, BRADFORD C. (1991) Architecture
B.Arch., California Polytechnic State University, San Luis Obispo, 1976;
M.Arch., University of California, Berkeley, 1981. Associate Professor.
Registered Architect, California.

- GRANT, DONALD P. (1967) Architecture
B.Arch., University of Oklahoma, 1961; M.Arch., University of Utah, 1964;
Ph.D., University of California, Berkeley, 1974. M.A., California Polytechnic
State University, San Luis Obispo, 1985. Professor. Registered Architect,
California, New York. Licensed General Contractor, California.
- GREENWALD, HARVEY C. (1973) Mathematics
B.S., Massachusetts Institute of Technology, 1964; M.A., Washington
University, 1966; Ph.D., 1970. Professor.
- GREIL, JAMES S. W. (1986) Crop Science
B.S., California State Polytechnic College, 1967; M.S., University of Nevada,
Reno, 1974. Professor.
- GRIFFIN, ROBERT E. (1976) University Foundation
B.S., University of Southern California, 1966; J.D., Western State University,
1974. Associate Executive Director.
- GRIMES, JOSEPH E. (1973) Computer Science
B.A., St. Ambrose College, 1963; M.S., Illinois State University, 1968;
Ph.D., Iowa State University, 1973. Professor.
- GRINDE, DONALD A., Jr. (1977) History
B.A., Georgia Southern College, 1966; M.A., University of Delaware, 1968;
Ph.D., 1974. Professor.
- GRINNELL, ROBIN R. (1967) Agricultural Engineering
B.S., Purdue University, 1955; M.S., University of Minnesota, 1961; Ph.D.,
Purdue University, 1976. Professor.
- GROVES, JOHN E. (1968) Statistics
B.A., Pasadena College, 1963; M.A., University of California, Riverside,
1965; Ph.D., Kansas State University, 1972. Professor.
- HAFEMEISTER, DAVID W. (1969) Physics
B.S., Northwestern University, 1957; M.S., University of Illinois, 1960;
Ph.D., 1964. Professor.
- HAFLEY, HAILA (1991) Associated Students, Inc.
B.A., Pacific Oaks College, 1989. Director, ASI Children's Center.
- HAGEN, CHARLES T. (1980) Philosophy
B.A., Harvard University, 1968; M.A., University of Michigan, 1977; Ph.D.,
1981. Professor.
- HAILE, ALLEN (1993) College of Business
A.B., University of Nebraska at Omaha, 1959; M.S., University of Southern
California, 1966; Diploma, Aeronautics and Space Vehicle Systems, Air
Force Institute of Technology, 1967; M.P.A., University of Southern
California, 1970; Ph.D., 1971. Dean.
- HALE, RUTH E. (1984) Administration and Finance
B.S., California Polytechnic State University, San Luis Obispo, 1974.
Assistant Director, Fiscal Services-Accounting Systems.
- HALE, THOMAS E. (1966) Mathematics
B.S., Indiana State University, 1960; M.S., 1963; M.S., St. Louis University,
1967; Ph.D., 1973. Professor.
- HALISKY, LINDA H. (1984) English
B.A., Whittier College, 1968; M.A., University of California, Riverside,
1978; Ph.D., 1984. Professor.
- HALL, KELLIE G. (1990) Physical Education and Kinesiology
B.S., Rocky Mountain College, 1977; M.S., Eastern Washington University,
1987; Ph.D., Louisiana State University, 1990. Assistant Professor.
- HALL, MICHAEL H. (1974) Animal Science
B.S., California Polytechnic State University, San Luis Obispo, 1973; M.S.,
Kansas State University, 1975. Professor.
- HALLOCK, BRENT G. (1979) Soil Science
B.S., University of California, Davis, 1970; M.S., 1972; Ph.D., 1976.
Professor. Certified Professional Soil Scientist; Certified Professional Soil
Erosion and Sediment Control Specialist.
- HAMPSEY, JOHN C. (1992) English
B.A., Holy Cross College, 1976; Ph.D., Boston College, 1982. Assistant
Professor.
- HAMPSON, BRIAN C. (1991) Food Science and Nutrition
B.S., University of Illinois at Champaign-Urbana, 1981; M.S., 1983; Ph.D.,
1988. Assistant Professor.
- HANDSHY, PATRICIA A. (1984) Health Services
B.S.N., N.P., Purdue University, 1982. Nurse Practitioner.
- HANNINGS, DAVID W. (1974) Ornamental Horticulture
B.S., Auburn University, 1972; M.S., Cornell University, 1974. Professor.
- HANSON, MICHAEL T. (1978) Biological Sciences
B.S., Idaho State University, 1970; M.A., University of Missouri, 1973;
Ph.D., Texas A & M University, 1976. Professor.
- HARATANI, JOYCE T. (1986) Administration and Finance
B.S., University of California, Los Angeles, 1974; B.S., California Polytechnic
State University, San Luis Obispo, 1979. Employment and Benefits Manager.
- HARGRAVE, TERRY C. (1979) Architecture
B.Arch.Eng., Washington State University, 1965; M.Arch., Massachusetts
Institute of Technology, 1978. Professor. Registered Architect, California.
- HARMON-ELLIOTT, ADELAIDE T. (1974) Mathematics
B.S., Fordham University, 1955; M.S., 1964; Ph.D., New York University,
1969. Professor.
- HARPER, LOUIS W. (1977) Crop Science
B.S., Montana State University, 1958; M.S., 1964. Professor.
- HARRIGAN, JOHN E., JR. (1969) Architecture
B.A., University of California, Berkeley, 1959; M.A., San Jose State College,
1962; Ph.D., Colorado State University, 1966. Professor.
- HARRIGAN, PAULINE W. (1983) Associated Students, Inc.
B.A., University of Massachusetts, 1979; M.S.W., University of Connecticut,
1981. Interim Executive Director.
- HARRINGTON, JOHN F. (1976) English
B.A., Washington State University, 1964; M.A., 1966; Ph.D., University of
Illinois, 1970. Professor.
- HARRIS, JAMES G. (1982) Electronic and Electrical Engineering
B.S., University of California, Berkeley, 1961; M.S., 1962; Ph.D., Syracuse
University, 1968. Professor.
- HARRIS, JOHN H. (1978) Natural Resources Management
B.S., Humboldt State College, 1968; M.S., 1970; Ph.D., Utah State
University, 1972. Professor.
- HARRIS, WALTER L. (1973) Admissions
B.S., California Polytechnic State University, San Luis Obispo, 1973; M.A.,
1975. Associate Director, Admissions.
- HARTIG, DONALD G. (1979) Mathematics
B.S., Rensselaer Polytechnic Institute, 1964; M.S., University of Wisconsin,
Milwaukee, 1966; Ph.D., University of California, Santa Barbara, 1970.
Professor.
- HASSLEIN, GEORGE J. (1949) Architecture
B.Arch., University of Southern California, 1945. Professor. FAIA.
- HAVANDJIAN, NISHAN (1980) Journalism
B.A., Haigazian College, Beirut, Lebanon, 1970; M.A., University of
Georgia, 1972; Ph.D., University of Texas at Austin, 1979. Professor and
Department Head.
- HAWES, MICHAEL (1967) Engineering Technology
B.Eng., University College, Dublin, Ireland, 1958; M.S., Ohio State
University, 1967. Professor. Registered Professional Engineer, Ohio.
- HAYDEN, JILL E. (1977) Career Services
B.A., University of California, Riverside, 1972; M.A., California Polytechnic
State University, San Luis Obispo, 1976. Career Counselor.
- HAYNES, RAY M. (1989) Management
B.S., University of Arizona, 1967; M.B.A., 1970; Ph.D., Arizona State
University, 1988. Associate Professor.
- HAYNES, ROY (1989) Student Academic Services
B.S., Austin Peay State University, 1980. Academic Adviser, Minority
Engineering Program.
- HEAD, DWAYNE G. (1966) Physical Education and Kinesiology
B.S., Jamestown College, 1958; M.S., South Dakota State University, 1963;
Ed.D., University of Oregon, 1967. Professor and Department Head.
- HEESCH, HENRY J. (1989) Graphic Communication
B.F.A., California School of Fine Arts, 1958; B.S., California State
Polytechnic College, 1965; M.T., Arizona State University, 1988. Assistant
Professor.

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- HEIDERSBACH, ROBERT (1986) Materials Engineering
B.Met.E., Colorado School of Mines, 1963; M.E., University of Florida,
1968; Ph.D., 1971. Professor and Department Head. Registered Professional
Engineer, California.
- HELLYER, GEORGE J. (1980)..... Agribusiness
B.S., University of California, Davis, 1960; M.S., 1973. Professor.
- HENDERSON, STANLEY L. (1990)..... Dairy Science
B.S., Iowa State University, 1973; M.S., Southern Illinois University, 1976;
Ph.D., Utah State University, 1990. Associate Professor.
- HENRY, DAVID (1976)..... Speech Communication
A.B., University of California, Berkeley, 1970; M.A., University of California,
Davis, 1974; Ph.D., Indiana University, 1976. Professor.
- HENSEL, BEVERLY J. (1972)..... College of Business
B.A., California State Polytechnic College, 1971; M.A., California
Polytechnic State University, San Luis Obispo, 1973. Counselor.
- HERLIHY, JACK J. (1975) Agribusiness
B.S., Manhattan College, 1962; M.B.A., California Polytechnic State
University, San Luis Obispo, 1978. Associate Professor.
- HEWITT, CLARISSA (1976)..... Art and Design
B.A., California State University, Northridge, 1971; M.F.A., Cranbrook
Academy, 1976. Professor.
- HIEMSTRA, B. KRIS (1984) Career Services
B.A., California State University, Northridge, 1974; M.A., 1978. Career
Counselor.
- HILL, PATRICK D. (1975)..... Architecture
B.Arch., University of Illinois, 1970; M.S., 1972. Professor. Registered
Architect, California.
- HINKLE, MARY ANN (1978) Financial Aid
B.S., California State Polytechnic College, San Luis Obispo, 1969. Loan
Program Manager.
- HINRICHS, MEREDITH (1986)..... Financial Aid
B.S., University of the State of New York, Albany, 1991; M.A., California
Polytechnic State University, 1994. Operations Program Manager.
- HITCHCOCK, VAUGHAN D. (1962)..... Physical Education and Kinesiology
B.S., Washington State University, 1956; M.A., San Francisco State College,
1965. Professor.
- HOCKADAY, STEPHEN L.M. (1982) Civil and Environmental Engineering
B.S., London University, 1965; M.S., University of California, Berkeley,
1968; Ph.D., 1969. Professor. Registered Professional Engineer, California,
Oregon, Great Britain.
- HOFFMAN, KENNETH A. (1974) Physics
B.A., University of California, Berkeley, 1966; M.A., 1969; Ph.D., 1973.
Professor.
- HOFFMANN, JON A. (1968) Aeronautical Engineering
B.S., University of Wisconsin, 1964; M.S., 1966; additional graduate study,
Wisconsin State University. Professor. Registered Professional Engineer,
California.
- HOLLAND, V. L. (1972)..... Biological Sciences
B.A., Fresno State College, 1966; M.A., 1969; Ph.D., University of
California, Berkeley, 1973. Professor and Department Chair.
- HOLZ, ALAN W. (1974)..... Mathematics
B.A., University of Washington, 1963; M.A., Bowdoin College, 1968;
Ph.D., Purdue University 1972. Professor.
- HOMAN, DENNIS N. (1966) Biological Sciences
B.A., University of Iowa, 1955; M.S., 1958; Ph.D., 1960. Professor.
- HOOD, J. MYRON (1977) Mathematics
B.A., Grinnell College, 1963; M.S., Northwestern University, 1965; Ph.D.,
Washington University, 1970. Professor.
- HOOVER, ROBERT L. (1970)..... Social Sciences
A.B., University of California, Berkeley, 1965; M.A., 1969; Ph.D., 1971;
additional graduate study, University of California, Berkeley, Stanford
University. Professor.
- HORTON, WILLIAM F. (1968) Electronic and Electrical Engineering
B.S., California Institute of Technology, 1946; M.S., 1948; Ph.D., University
of California, Los Angeles, 1966. Professor.
- HOULGATE, LAURENCE D. (1979) Philosophy
B.A., California State College, Los Angeles 1960; M.A., Ph.D., University of
California, Los Angeles, 1967. Professor.
- HOWARD, WILLIAM A. (1980)..... City and Regional Planning
B.A., University of Denver, 1958; M.A., 1960; Ph.D. University of
Edinburgh, 1973. Professor.
- HOWELL, ROBERT (1974)..... Art and Design
B.A., Brooks Institute, 1973; M.A., Pepperdine University, 1976. Professor.
- HSIEH, CARL C. F. (1970)..... Civil and Environmental Engineering
B.S., National Taiwan University, 1961; M.S.C.E., South Dakota School of
Mines and Technology, 1965; Ph.D., Northwestern University, 1968.
Professor. Registered Professional Engineer, California.
- HSU, JOHN Y. S. (1970)..... Computer Science
B.S., National Taiwan University, 1959; M.S., University of California,
Berkeley, 1964; Ph.D., 1969. Professor.
- HUEHN, KEMPTON L. (1968) Mathematics
B.S., Iowa State University, 1957; M.S., 1962; Ph.D., Colorado School of
Mines, 1975. Professor.
- HUFF, EARL D. (1970) Political Science
B.A., San Francisco State College, 1959; M.A., University of Idaho, 1969;
Ph.D., 1971. Professor.
- HUNT, ROGER M. (1979) Animal Science
B.S., California State Polytechnic College, 1971; M.S., California Polytechnic
State University, San Luis Obispo, 1978. Associate Professor.
- HUTCHINSON, JAMES R. (1971) Graphic Communication
B.F.A., Carnegie Institute of Technology, 1955; B.S., 1959; M.A., California
State University, Dominguez Hills, 1977. Professor.
- HUTTON, REX L. (1966)..... Mathematics
B.S., Baldwin Wallace College, 1959; M.S., Illinois Institute of Technology,
1964; Ed.D., Arizona State University, 1972. Professor.
- IANNCE, MICHAEL A. (1978)..... Mechanical Engineering
B.S., Valparaiso University, 1961; M.S., University of California, Los
Angeles, 1968; Ph.D., 1971. Professor.
- IKEDA, KIMI M. (1985-88, 1989) Administration and Finance
B.S., California Polytechnic State University, San Luis Obispo, 1988.
Associate Director, Budget Planning and Administration.
- IKENOYAMA, GEORGE K. (1964) Architecture
B.S., California State Polytechnic College, 1955; M.Arch., University of
Hawaii, 1972. Professor. Registered Architect, California.
- INCHAUSTI, ROBERT L. (1984)..... English
B.A., California State University, Sacramento, 1974; M.A., 1976; Ph.D.,
University of Chicago, 1981. Professor.
- IQBAL, M. ZAFAR (1979)..... Accounting
B.S., University of Nevada, Reno, 1969; M.B.A., Northern Illinois
University, 1972; Ph.D., University of Nebraska, Lincoln, 1979. Professor.
Certified Public Accountant, Certified Management Accountant, Certified
Internal Auditor, Certified Cost Analyst.
- IRVIN, GLENN W. (1986) Academic Programs
B.A., Arizona State University, 1964; M.A., 1971; Ph.D., 1978. Associate
Vice President for Academic Affairs and University Dean.
- JACKSON, LORRAINE D. (1992)..... Speech Communication
B.A., University of Western Ontario, 1987; M.A., Pennsylvania State
University, 1989; Ph.D., 1992. Assistant Professor.
- JACOBSON, NORMAN (1986) Administration and Finance
B.T., Oregon Technical Institute. Energy Coordinator.
- JACOBSON, RALPH A. (1975)..... Chemistry
B.A., Montclair State College, 1962; Ph.D., Cornell University, 1966.
Professor.
- JAMIESON, LYNN M. (1980)..... Natural Resources Management
B.A., Muskingum College, 1968; M.S., Indiana University, 1976; Re.D.,
1980. Professor.
- JANKAY, PETER (1973)..... Biological Sciences
B.A., San Fernando Valley State College, 1966; M.S., 1969; Ph.D.,
University of California, Santa Barbara, 1973. Professor.
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- JANOWICZ, ROSEMARIE (1993) Health Services
B.S., California Polytechnic State University, San Luis Obispo, 1978. Clinical
Laboratory Technologist.
- JANSSON, A. KIRBY (1985) College of Engineering
B.S., California Polytechnic State University, San Luis Obispo, 1979.
Administrative Assistant.
- JASTER, EDWIN H. (1992) Dairy Science
B.S., University of Wisconsin, 1970; M.S., University of Arizona, 1977;
Ph.D., 1979. Department Head.
- JEFFERSON, DOROTHY (1982) Student Academic Services
B.A., Los Angeles State College, 1957; M.A., California Polytechnic State
University, San Luis Obispo, 1977. Academic Adviser/Technical Study Center
Coordinator.
- JELINEK, CYNTHIA J. (1976) College of Science and Mathematics
B.S., Marietta College, 1967. Director of Advising Center.
- JEN, JOSEPH (1992) College of Agriculture
B.S., National Taiwan University, 1960; M.S., Washington State University,
1964; M.B.A., Southern Illinois University, 1986; Ph.D., University of
California, Berkeley, 1969. Dean.
- JENNINGS, CHARLES W. (1968) Art and Design
B.A., Wheaton College, 1966; M.A., M.F.A., Northern Illinois University,
1968. Professor and Department Chair.
- JERICICH, GEORGE D. (1976) Art and Design
B.A., San Jose State University, 1972; M.A., 1976; M.F.A., 1983. Professor.
- JOHNSON, BROOKS (1992) Intercollegiate Athletics
B.A., Tufts University, 1956. Head Coach.
- JOHNSON, ERIC B. (1980) Art and Design
B.A., University of Oregon, 1971; M.A., University of New Mexico, 1975;
M.F.A., 1978. Professor.
- JOHNSON, ERIC V. (1969) Biological Sciences
B.A., Brown University, 1964; Ph.D., Cornell University, 1969. Professor.
- JOHNSON, JANE (1980) Career Services
B.S., California Polytechnic State University, San Luis Obispo, 1978. Career
Counselor.
- JOHNSON, MADELEINE M. (1985) University Library
B.A., Immaculate Heart College, Los Angeles, 1962; M.L.S., University of
California, Los Angeles, 1967. Associate Librarian.
- JOHNSON, MARK S. (1989) Mechanical Engineering
B.S., Stanford University, 1983; M.S., 1983; Ph.D. 1990. Assistant
Professor.
- JOHNSON, RICK (1983) Associated Students, Inc.
B.A., University of the Pacific, 1978; M.A., 1982. Director, Recreational
Sports.
- JOHNSON, WILLIAM V. (1966) Music
B.M.E., Indiana University, 1962; M.M., University of Michigan, 1966.
Professor.
- JOHNSTON, HAROLD A. (1988) Construction Management
B.S., Washington State University, 1970; M.S., University of Florida, 1983.
Associate Professor. Certified Professional Estimator, Licensed General
Contractor.
- JOINES, LAURA E. (1989) Architecture
A.B. Vassar College, 1981; M.Arch., North Carolina State University, 1987.
Assistant Professor.
- JONES, CAROLYN (1973) Career Services
B.S., Kansas State University, 1972; M.A., California Polytechnic State
University, San Luis Obispo, 1975. Career Counselor.
- JONES, DANE R. (1976) Chemistry
B.A., University of Utah, 1969; Ph.D., Stanford University, 1974. Professor.
- JUNCO, MARIA L. (1989) Theatre and Dance
B.A., University of California, Los Angeles, 1985; M.A., 1988. Assistant
Professor.
- KALATHIL, JAMES S. (1965) Physics
B.S., University of Madras, 1956; M.A., Southern Illinois University, 1963;
Ph.D., University of Nevada, 1977. Professor.
- KALISKI, MARTIN E. (1986) Electronic and Electrical Engineering
B.S., Massachusetts Institute of Technology, 1966; M.S., 1968; Ph.D., 1971.
Professor.
- KAMINAKA, M. STEPHEN (1984) Agricultural Engineering
B.S., University of California, Davis, 1968; M.S., University of Hawaii,
1973; Ph.D., Cornell University, 1977. Professor.
- KANN, DAVID J. (1969) English
B.A., Brandeis University, 1964; M.A., New York University, 1966; Ph.D.,
Occidental College, 1971. Professor.
- KATO, GORO C. (1981) Mathematics
B.S., Shizuoka University, Japan, 1972; M.A., West Virginia University,
1974; Ph.D., University of Rochester, 1979. Professor.
- KEELING, DAVID L. (1975) Chemistry
B.S., Arizona State University, 1969; Ph.D., University of Hawaii, 1974.
Professor.
- KEEP, ROGER L. (1968) Industrial Technology
B.S., Brigham Young University, Hawaii, 1967; M.S., Stout State University,
1968; Ed.D., Utah State University, 1972. Professor. Licensed General
Contractor.
- KEESEY, DOUGLAS (1988) English
B.A., University of California, Berkeley, 1982; M.A., 1984; Ph.D., Princeton
University, 1988. Assistant Professor.
- KEETCH, BRENT H. (1967) English
B.A., Utah State University, 1965; M.A., 1966; Ph.D., University of Utah,
1971. Professor and Department Chair.
- KEIL, DAVID J. (1976) Biological Sciences
B.S., Arizona State University, 1968; M.S., 1970; Ph.D., Ohio State
University, 1973. Professor.
- KELLER, EARL C. (1987) Accounting
B.B.A., University of Houston, 1963; M.B.A., University of Washington,
1970; Ph.D., University of Washington, 1973. Professor. Certified Public
Accountant.
- KELLER, ELMO A., JR. (1963) Computer Science
B.A., Brigham Young University, 1959; M.A., 1961; Ph.D., Iowa State
University, 1972. Professor.
- KELLERMAN, MARTIN A. (1968) Chemistry
B.S., Polytechnic Institute of Brooklyn, 1953; Ph.D., University of
Washington, 1966. Associate Professor.
- KELLOGG, WILLIAM C. (1983) Agricultural Education
B.S., California Polytechnic State University, San Luis Obispo, 1976; M.S.,
1983; Ph.D., Colorado State University, 1987. Professor.
- KENNEDY, EUEL W. (1974) Enrollment Support Services
B.S., East Central State University, 1962; M.S., University of Utah, 1964;
Ph.D., 1972. Associate Vice President of Enrollment Support Services and
Professor of Mathematics.
- KERBO, HAROLD R. (1977) Social Sciences
B.A., University of Oklahoma, 1970; M.A., 1972; Ph.D., Virginia
Polytechnic Institute and State University, 1975. Professor and Department
Chair.
- KERSTEN, TIMOTHY W. (1971) Economics
B.A., Sacramento State College, 1967; M.A., University of Oregon, 1970;
Ph.D., 1973. Professor.
- KESNER, BRIAN B. (1980) Architecture
B.Arch., University of California, Berkeley, 1967; M.Arch., 1968. Professor.
Registered Architect, Colorado.
- KHALIL, HANY M. (1987) Food Science and Nutrition
B.S., University of Alexandria, Egypt, 1973; M.S. University of Illinois,
Champaign-Urbana, 1983; Ph.D., 1987. Professor.
- KING, LAURA M. (1989) Psychology and Human Development
B.A., University of Arkansas, 1977; M.S., Kansas State University, 1980;
Ph.D., 1989. Assistant Professor.
- KITAMURA, ROBERT E. (1978) Administration and Finance
B.Arch., California Polytechnic State University, San Luis Obispo, 1975;
M.S., 1993. Director, Facilities Planning.

- KNABLE, ANTHONY E. (1973).....Biological Sciences
B.A., Blackburn College, 1965; M.A., Southern Illinois University, 1967;
Ph.D., 1972. Professor.
- KNECHT, GEORGE N. (1973)Biological Sciences
B.S., Rutgers University, 1962; M.S., 1969; Ph.D., University of Arizona,
1975. Professor.
- KNIGHT, RANDALL D. (1989) Physics
B.S., Washington University, 1972; Ph.D., University of California, Berkeley,
1979. Professor.
- KOHLER, KEN (1983) Architecture
B.S., California State Polytechnic College, 1965; B.Arch., 1966; M.Arch.,
Sheffield University, England, 1982. Professor. Registered Architect,
California.
- KOLKAILAH, FAYSAL A. (1984) Aeronautical Engineering
B.S., Cairo University, Egypt, 1969; M.S., University of Cincinnati, 1978;
Ph.D., Louisiana State University, 1982; additional graduate study, Cairo
University. Professor. Registered Professional Engineer, Egypt.
- KOOB, ROBERT D. (1990) Academic Affairs
B.A., University of Northern Iowa, 1962; Ph.D., University of Kansas, 1967.
Vice President for Academic Affairs and Senior Vice President.
- KOURAKIS, JOSEPH M. (1970) City and Regional Planning
B.Arch., University of Illinois, 1954; M.Arch., 1957; M.C.P., University of
California, Berkeley, 1961. Professor. Registered Architect, California.
- KRANZDORF, RICHARD B. (1971) Political Science
A.B., University of Pennsylvania, 1958; M.A., 1959; M.A., University of
California, Los Angeles, 1970; Ph.D., 1973. Professor.
- KREJSA, RICHARD J. (1968) Biological Sciences
B.S., Michigan State College, 1954; M.A., University of California, Los
Angeles, 1958; Ph.D., University of British Columbia, Vancouver, 1964.
Professor.
- KRIEGER, DANIEL E. (1971) History
B.A., San Jose State College, 1965; Ph.D., University of California, Davis,
1973. Professor.
- KRISHNAN, R. (1987) Business Administration
B.Eng., College of Engineering, Guindy, India, 1974; M.Tech.I.E., Indian
Institute of Technology, New Delhi, India, 1976; Ph.D., Virginia Polytechnic
and State University, 1984. Professor.
- KUBINSKI, A. MARK (1975) Biological Sciences
B.A., Gonzaga University, 1968; M.S., Washington State University, 1971;
Ph.D., 1974. Professor.
- LaBARBERA, JEANNE (1984) Associated Students, Inc.
B.A., University of California, Los Angeles, 1973; M.A., 1976; Ph.D.,
University of California, Santa Barbara, 1988. Galerie Director.
- LABHARD, LEZLIE A. (1967) Home Economics
B.S., University of California, Davis, 1965; M.S., 1967. Professor.
- LAKEMAN, SANDRA DAVIS (1981) Architecture
M.Arch., University of Oregon, 1977. Professor. Registered Architect,
Oregon and Arizona.
- LAMB, STEPHAN R. (1979) Residential Life and Education
B.A., Santa Clara University, 1973; M.A., University of the Americas, 1975.
Associate Director.
- LAMBERT, ROYCE L. (1969) Soil Science
B.S., Purdue University, 1964; M.S., 1966; Ph.D., 1969. Professor. Certified
Professional Soil Scientist, Certified Professional Soil Erosion and Sediment
Control Specialist.
- LAMBERT, WALTER M. (1975) Student Life and Activities
B.A., California State College, Long Beach, 1962. Coordinator of Greek
Affairs.
- LANDWEHR, ALFRED W. (1970) English
B.A. University of Missouri, 1963; M.A., 1964; Ph.D., 1970. Professor.
- LANG, MARTIN T. (1969) Mathematics
B.A., North Central College, Illinois, 1959; M.A., University of Kansas,
1963, Ph.D., University of Texas at Austin, 1973. Professor.
- LANG, ROBERT J. (1991) Civil and Environmental Engineering
B.S., University of California, Davis, 1978; M.S., 1982; Ph.D., 1989.
Associate Professor. Registered Professional Engineer, California, National
Council of Examiners for Engineering and Surveyors.
- LANGE, JOHN H. (1975) Architecture
B.S., University of Cincinnati, 1968; M.Arch., Stanford University, 1972;
Ph.D., University of Pennsylvania, 1975. Professor. Registered Architect,
California.
- LANGE, KAREN F. (1991) Home Economics
B.Arch., California Polytechnic State University, San Luis Obispo, 1980;
M.Arch., Columbia University, 1982. Assistant Professor.
- LANT, KATHLEEN MARGARET (1983) English
B.A., University of Illinois, 1971; M.A., University of Oregon, 1975; Ph.D.,
1982. Professor.
- LAPORTE, MARY L. (1985) Art and Design
B.A., Washington State University, 1975; M.F.A., 1980. Professor.
- LARSEN, STUART E. (1969) Civil and Environmental Engineering
B.S., University of Cincinnati, 1963; M.S., 1965. Professor. Registered
Professional Engineer, California.
- LASCOLA, RUSSELL A. (1970) Philosophy
B.A., California State College, Los Angeles, 1962; M.A., University of
Southern California, 1964; Ph.D., 1969. Professor.
- LASSANSKE, DANIEL E. (1975) Ornamental Horticulture
B.S., California State Polytechnic College, 1970; M.S., 1971. Professor.
- LAU, FREDERICK C. (1991) Music
B.A., Chinese University of Hong Kong, 1981; Flute Performance Artist
Diploma, Guildhall School of Music and Drama, London, 1982; M.M.,
University of Illinois, Urbana-Champaign, 1984; D.M.A., 1991. Assistant
Professor.
- LAZERE, DONALD P. (1977) English
B.A., Northwestern University, 1958; M.A., Columbia University, 1964;
Ph.D., University of California, Berkeley, 1973. Professor.
- LEBENS, FRANK T. (1972-78) (1981) Administration and Finance
B.S., Iowa State University, 1964; M.B.A., California Polytechnic State
University, San Luis Obispo, 1972; M.A., 1975. Vice President,
Administration and Finance.
- LEE, PETER Y. (1981) College of Engineering
B.S., National Taiwan University, 1961; M.S. Tulane University, 1965;
Ph.D., 1968. Professor and Dean. Registered Professional Engineer,
Louisiana.
- LEONG, KINGSTON L. (1970) Biological Sciences
B.S., University of Hawaii, 1963; M.S., 1966; Ph.D., Oregon State
University, 1970. Professor.
- LENER, NORMAN (1986) Art and Design
B.A., 1951, New York University; M.A., 1964. Professor.
- LEVENSON, HARVEY R. (1983) Graphic Communication
B.S., Rochester Institute of Technology, 1967; M.S., South Dakota State
University, 1968; Ph.D., University of Pittsburgh, 1980. Department Head.
- LEVI, DANIEL J. (1982) Psychology and Human Development
B.A., Lehigh University, 1973; M.S., University of Arizona, 1979; Ph.D.,
1981. Associate Professor.
- LEVENHAGEN, MICHAEL J. (1994) Management
B.A., Carroll College, 1979; M.B.A., University of Illinois at Champaign-
Urbana, 1982; Ph.D., 1992. Associate Professor.
- LEVISON, ROBERT L. (1969) University Center for Teacher Education
B.S., Southern Oregon College, 1963; M.Ed., University of Wyoming, 1966;
Ed.D., New Mexico State University, 1972. Professor.
- LEWIS, GEORGE M. (1967) Mathematics
B.A., Stanford University, 1961; M.A., University of Southern California,
1964; Ph.D., 1970. Professor.
- LI, ELTON Y. (1982) Management
B.Commerce, National Chengchi University, Taiwan, 1975; M.S.B.A., Texas
Tech University, 1978; Ph.D., 1981. Professor.
- LINDVALL, JOHN R. (1973) Business Administration
B.A., Whitman College, 1962; M.B.A., Indiana University, 1971; Ph.D., 1973.
Professor.

- LITTLE, WILLIAM T. (1983) Foreign Languages and Literatures
B.A., California State College, Northridge, 1966; M.A., Indiana University,
1968; Ph.D., Washington University, 1973. Professor and Department Head.
- LIU, HONG-TING (1984) Architectural Engineering
B.S., Zhejiang University, 1952; Ph.D., University of Minnesota, 1984.
Professor.
- LO, CHIEN-KUO (1983) Civil and Environmental Engineering
B.S., National Cheng Kung University, Taiwan, 1969; M.S., 1973; Ph.D.,
University of Iowa, 1981. Professor.
- LOCASCIO, JAMES GASPARE (1981) Mechanical Engineering
B.S., Newark College of Engineering, 1970; M.S., University of California,
Santa Barbara, 1971; Ph.D., 1988. Associate Professor.
- LOE, NANCY E. (1982) University Library
B.A., Aurora College, 1975; M.S., M.A., Catholic University of America,
1977. Librarian.
- LOFTUS, ROBIN L. (1978) Financial Aid
B.A., California Polytechnic State University, San Luis Obispo, 1976; M.A.,
1978. Assistant Director.
- LOH, ALICE C. (1974) Landscape Architecture
B.Arch., University of Manitoba, 1966; M.L.A., University of Oregon, 1972.
Professor. Registered Architect and Landscape Architect, California.
- LOH, LARRY (1979) Architecture
B.Arch., University of Manitoba, Canada, 1965; M.Arch. in U.D.,
Washington University, 1969. Professor. Registered Architect, California.
- LONDON, BLAIR (1993) Materials Engineering
B.S. Drexel University, 1981; M.S., Stanford, 1983; Ph.D., 1986. Associate
Professor.
- LONG, DIANNE N. (1982) Political Science
B.S., State University of New York College at Buffalo, 1964; M.P.A.,
Michigan State University, 1977; Ph.D., 1982. Professor.
- LORD, DAVID (1985) Architecture
B.S., University of Arizona, 1962; M.S., 1966; M.Arch., University of
California, Berkeley, 1972; Ph.D., University of London, 1987. Professor.
- LORD, SARAH (1986) Agricultural Education
B.A., University of Montana, 1972; Ed.M., Oregon State University, 1977;
Ph.D., 1979. Professor.
- LUCAS, NANCY (1977) English
B.A., Incarnate Word College, 1964; M.A., University of Illinois, 1966;
Ph.D., 1973. Professor.
- LUNA, GEORGE W. (1977) Mathematics
B.A., University of California, Santa Barbara, 1962; M.A., University of
California, Los Angeles, 1965; Ph.D., University of Washington, 1973.
Professor.
- LUND, JOAN (1977) Administration and Finance
B.A., California Polytechnic State University, San Luis Obispo, 1985; M.A.,
1990. Staff Development and Training Manager.
- LUND, MICHAEL W. (1984) Animal Science
B.S., North Dakota State University, 1970; M.S., 1981. Associate Professor.
- LUTHRA, SHAM S. (1972) Computer Science
B.A., Punjab University, India, 1952; M.A., 1954; M.S., University of
Alberta, Canada, 1969; Ph.D., University of Minnesota, 1974. Professor.
- LUTRIN, CARL E. (1970) Political Science
B.A., Adelphi University, 1962; M.S., University of Wisconsin, 1965; Ph.D.,
University of Missouri, 1971; additional graduate work, Stanford University.
Professor.
- LUTRIN, PATRICIA (1975) Student Life and Activities
B.A., St. Cloud State University, 1965; M.A., University of Iowa, 1969.
Coordinator, Community Services.
- MAAS, DONALD K. (1976) University Center for Teacher Education
B.A., University of California, Los Angeles, 1966; M.Ed., State University of
New York at Buffalo, 1969; Ed.D., 1971. Professor.
- MacCARLEY, C. ARTHUR (1988) Electronic and Electrical Engineering
B.S., University of California, Los Angeles, 1976; M.S., 1978; Ph.D., Purdue
University, 1987. Associate Professor.
- MacCURDY, CAROL A. (1987) English
B.A., Southwestern at Memphis, 1972; M.A., University of South Carolina,
1975; Ph.D., 1980. Associate Professor.
- MACIAS, RAY (1980) Administration and Finance
B.A., University of Texas, 1965. Certified Purchasing Manager. Director,
Support Services.
- MAKSOUDIAN, Y. LEON (1963) Statistics
B.S., California State Polytechnic College, 1957; M.S., University of
Minnesota, 1961; Ph.D., University of Minnesota, 1970. Professor.
- MALKIN, MICHAEL R. (1974) Theatre and Dance
A.B., Tufts University, 1965; M.A., 1970; Ph.D., 1971. Professor.
- MALLAREDDY, H. (1981) Civil and Environmental Engineering
B.E., Mysore University, India, 1958; M.E., University of Oklahoma, 1966;
Ph.D., 1968. Professor. Registered Professional Engineer, California, Indiana
and Louisiana.
- MALMBORG, FREDRICK B. (1969) Mechanical Engineering
B.S., New York University, 1955; M.S., Columbia University, 1963.
Associate Professor.
- MARAVIGLIA, JAMES L. (1991) Admissions
B.S., Elmhurst College, 1976; M.S., Chicago State University, 1984. Director
of Admissions.
- MARK, WALTER R. (1972) College of Agriculture
B.S., Utah State University, 1968; M.S., Colorado State University, 1970;
Ph.D., 1972. Professor and Associate Dean. Registered Professional Forester,
California.
- MARLER, JOHN F. (1981) Chemistry
B.S., University of Wisconsin, Stevens Point, 1972; Ph.D., University of
Wisconsin, Madison, 1978. Professor.
- MARLOW, MICHAEL L. (1988) Economics
B.A., George Washington University, 1975; Ph.D., Virginia Polytechnic
Institute, 1978. Professor.
- MARPLE, DEBBIE L. (1976) Administration and Finance
B.S., California Polytechnic State University, San Luis Obispo, 1976.
Associate Director, Budget Planning and Administration.
- MARTIN, W. MIKE (1985) Architecture
B.Arch., University of Colorado, 1969; M.Arch., University of Washington,
1971; Ph.D., University of California, Berkeley, 1983. Professor. Registered
Architect, Kansas and California. NCARB Certificate.
- MARTINEZ, WILLIAM (1994) Foreign Languages and Literatures
B.A., San Diego State University, 1982; M.A., 1988; Ph.D., University of
California, Irvine, 1994. Assistant Professor.
- MARTINEZ-INUNZA, EVERARDO (1982) Admissions
B.S., California Polytechnic State University, San Luis Obispo, 1980; M.S.,
1983. Assistant Director, Admissions.
- MARX, STEVEN R. (1988) English
A.B., Columbia University, 1963; A.M., 1966; Ph.D., Stanford University,
1981. Associate Professor.
- MASON, ANTHONY K. (1980) Industrial and Manufacturing Engineering
B.S., University of Southern California, 1959; M.S., 1963; Ph.D., 1967.
Professor. Registered Professional Engineer, California.
- MAXWELL, JOHN C. (1978) Chemistry
B.S., Whitworth College, 1969; Ph.D., Colorado State University, 1979.
Professor and Department Chair.
- MAYO, EDWARD L. (1968) History
B.A., Claremont Men's College, 1959; M.A., 1966; Ph.D., Claremont
Graduate School, 1969. Professor.
- McBRIDE, SUSAN L. (1979) University Center for Teacher Education
B.S., University of Akron, 1963; M.S., 1972; Ph.D., 1979. Professor.
- McBURNIE, KATHLEEN A. (1991) Food Science and Nutrition
B.S., Michigan State University, 1965; M.P.H., University of Michigan,
1972; Dr.P.H., University of California, Berkeley, 1989. Assistant Professor.
Registered Dietitian.
- McCORKLE, ROBERT E. (1962) Agribusiness
B.S., California State Polytechnic College, 1960; M.S., University of
California, 1962; additional graduate study, Oregon State University,
University of Wisconsin. Professor.

- McCUTCHEON, JOHN (1992) Intercollegiate Athletics
B.S., Indiana University of Pennsylvania, 1975; M.S., Ohio University, 1977.
Director of Athletics.
- McDERMOTT, STEVEN T. (1989) Speech Communication
B.A., San Jose State University, 1973; M.A., 1976; Ph.D., Michigan State
University, 1980. Associate Professor.
- McDILL, JEAN M. (1973) Mathematics
B.S., University of Texas, 1957; M.S., University of Florida, 1968; Ph.D.,
1971. Professor.
- McDONALD, ANNA J. (1991) Affirmative Action
B.A., Lincoln University, 1967; M.A., California State University, Fresno,
1980; A.M., Stanford University, 1986; Ph.D. candidate. Director.
- McDONALD, LUANN A. (1983) Financial Aid
B.A., California Polytechnic State University, San Luis Obispo, 1978; M.A.,
1981. Counselor.
- McDONALD, MARGOT (1992) Architecture
B.A., B.S., University of California, Santa Barbara, 1980; M.Arch.,
University of Oregon, 1987. Assistant Professor. Registered Architect,
Oregon. NCARB Certificate.
- McDOWELL, ERIC (1992) Intercollegiate Athletics
B.S., University of New Haven, 1983. Sports Information Director.
- McFARLAND, STEVE (1983) Intercollegiate Athletics
B.Sc., California Polytechnic State University, San Luis Obispo, 1972. Head
Coach.
- McGARY, STEPHEN D. (1984) Agribusiness
B.S., Brigham Young University, 1979; M.S., 1980; Ph.D., Washington State
University, 1984. Professor.
- McKIBBIN, CARROLL R. (1974) Political Science
B.A., Drake University, 1959; M.A., 1960; Ph.D., University of Kansas,
1967. Professor.
- McKIM, PATRICK C. (1973) Social Sciences
B.A., University of California, Berkeley, 1967; M.A., 1970; Ph.D., 1973.
Professor.
- McKINSTRY, JOHN A. (1968) Social Sciences
A.B., University of California, Los Angeles, 1961; A.M., University of
Southern California, 1963; Ph.D., 1970. Professor.
- McLAMORE, ALYSON (1991) Music
B.A., University of California at Los Angeles, 1982; M.A., 1985; Ph.D.,
1991. Assistant Professor.
- McMORRAN, WAYNE E. (1962) Electronic and Electrical Engineering
B.S., California State Polytechnic College, 1960; M.S., New York University,
1962. Professor.
- McNEIL, ROBERT J. (1976) Crop Science
B.S., Rutgers University, 1967; M.S., 1970; Ph.D., 1975. Professor.
- MEAGHER, JAMES M. (1988) Mechanical Engineering
B.S., University of Akron, 1978; M.S., 1981; Ph.D., University of California,
Berkeley, 1987. Associate Professor.
- MEHDIZADEH, AMROLLAH (1984) Mechanical Engineering
B.S., Abadan Institute of Technology, 1978; M.S., University of Southern
California, 1980; Ph.D., 1984. Professor.
- MELVIN, BARBARA A. (1973) Administration and Finance
B.S., California Polytechnic State University, San Luis Obispo, 1973; M.P.A.,
University of San Francisco, 1981. Human Resources Manager.
- MENDENHALL, JOHN P. (1980) Art and Design
B.F.A., University of Illinois, 1972; M.A., Stanford University, 1974.
Professor.
- MENG, SHIEN YI (1968) Electronic and Electrical Engineering
B.S., Taiwan Provincial Cheng Kung University, 1953; M.S., Oklahoma State
University, 1958; Ph.D., Ohio State University, 1968. Professor.
- MENON, UNNY (1978) Industrial and Manufacturing Engineering
A.P., Sheffield Polytechnic, England, 1969; M.Phil., 1972; Ph.D. University
of Nottingham, 1985. Professor. Registered Professional Engineer, Great
Britain.
- METCALF, LYNN E. (1986) Business Administration
B.A., University of Oregon, 1978; M.I.M., American Graduate School of
International Management, 1981; Ph.D., University of South Carolina, 1986.
Professor.
- MICHELFEIDER, DIANE P. (1981) Philosophy
B.A., Bryn Mawr College, 1975; Ph.D., University of Texas, 1982. Professor
and Department Chair.
- MIKLOWITZ, PAUL S. (1988) Philosophy
B.A., University of California, Santa Cruz, 1977; M.A., University of
Chicago, 1979; M.Phil., Ph.D., Yale University, 1988. Associate Professor.
- MILLER, CHARLES R. (Tad) (1987) Accounting
B.A., College of Wooster, 1970; M.B.A., University of Arizona, 1980; Ph.D.,
1987. Associate Professor. Certified Public Accountant.
- MILLER, SANDRA D. (1984) Architecture
B.A., Oberlin College, 1963; M.Arch., University of California, Berkeley,
1978. Professor. Registered Architect, California.
- MOAZZAMI, SARA (1991) Civil and Environmental Engineering
B.S., George Washington University, 1981; M.S., University of California,
Berkeley, 1982; Ph.D., 1987. Assistant Professor.
- MOIR, NEIL J. (1970) Chemistry
B.S., Lewis and Clark College, 1962; M.S., University of Oregon Medical
School, 1966; Ph.D., 1968; Postdoctoral Fellow, Cornell University, 1968-
1970. Professor.
- MONTECALVO, JOSEPH (1983) Food Science and Nutrition
B.S., University of Rhode Island, 1972; M.S., 1975; Ph.D., 1979. Professor
and Department Head.
- MONTEEN, GINNY (1983) University Relations and Development
B.S., University of Illinois, 1966. Publications Editor.
- MONTGOMERY, WAYNE R. (1982) University Library
A.B., University of California, Berkeley, 1977; M.L.S., University of
California, Los Angeles, 1981. Senior Assistant Librarian.
- MOORE, CAROLE M. (1980) Career Services
B.A., California Polytechnic State University, San Luis Obispo, 1976; M.A.,
1978. Career Counselor.
- MORENO, J. KELLY (1991) Psychology and Human Development
B.S., University of California, Santa Barbara, 1980; M.S., University of Utah,
1985; Ph.D., 1988. Assistant Professor. Licensed Psychologist, California.
- MOREY, KRISHNAKUMAR (KRIS) S. (1970) Food Science and Nutrition
B.S., Nagpur University, India, 1955; M.S., 1958; M.S., University of
California, San Francisco, 1963; Ph.D., University of California, Berkeley,
1967. Professor.
- MORGAN, ANN (1980) Psychology and Human Development
B.A., Texas Tech University, 1971; M.A., 1975; Ph.D., 1980. M.A.,
Wichita State University, 1990. Professor.
- MORI, BARBARA L. ROWLAND (1986) Social Sciences
B.A., Hofstra University, 1967; M.A., University of Hawaii, 1983; Ph.D.,
1987. Associate Professor.
- MORRIS, NANCY A. (1985) Home Economics
B.S., Central Michigan University, 1973; M.S., 1978; Ph.D., Ohio State
University, 1983. Associate Professor.
- MORRISON, KENT E. (1979) Mathematics
B.A., University of California, Santa Cruz, 1971; Ph.D., 1977. Professor.
- MORROBEL-SOSA, ANNY (1990) Materials Engineering
B.Sc., University of Puerto Rico, 1976; M.Sc., State University of New York,
Stony Brook, 1980; Ph.D., University of Southern California, 1985. Associate
Professor.
- MOSHER, LYNN S. (1974) Industrial Technology
B.S., State University College, Oswego, New York, 1963; M.Ed., St.
Lawrence University, 1966; Ed.D., Utah State University, 1972. Professor.
- MOTT, W. STEPHEN (1972) Graphic Communication
B.S., California State Polytechnic College, 1959; M.A., California
Polytechnic State University, San Luis Obispo, 1973. Professor.
- MOTTMANN, JOHN (1974) Physics
B.A., University of California, Los Angeles, 1966; M.A., 1967; Ph.D., 1972.
Professor.

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- MOUSTAFA, SAFWAT M. A., (1984) Mechanical Engineering
B.S., University of Alexandria, 1960; M.S., University of California, Davis,
1963; Ph.D., Michigan State University, 1967. Professor. Registered
Professional Engineer, Illinois and Iowa.
- MUELLER, GERRY K. (1984) Office of the President
B.A., University of Hawaii, 1972. Presidential Aide.
- MUELLER, JAMES R. (1980) Mathematics
B.A., University of Wisconsin, 1975; Ph.D., California Institute of
Technology, 1982. Professor.
- MUELLER, WESLEY J. (1984) Crop Science
B.S., Brigham Young University, 1977; M.S., 1981, Ph.D., 1983, Utah State
University. Associate Professor.
- MULLIGAN, PATRICIA A. (1988) University Center for Teacher Education
B.A., Arizona State University, 1971; M.Ed., Kent State University, 1977;
M.A., Northern Arizona University, 1978; Ph.D., Arizona State University,
1987. Assistant Professor.
- MULLISEN, RONALD S. (1977) Mechanical Engineering
B.S., California State Polytechnic College, 1969; M.Engr., 1976; Ph.D.,
Colorado State University, 1983. Professor. Registered Professional Engineer,
California.
- MUNROE, PATRICK A. (1980) Graphic Communication
A.O.C.A., Ontario College of Art, 1976; M.F.A., Virginia Commonwealth
University, 1986. Professor.
- MURPHY, JAMES L. (1981) Industrial Technology
B.A., Long Beach State College, 1971; M.A., California Polytechnic State
University, San Luis Obispo, 1985. Associate Professor.
- MURPHY, PAUL F. (1970) Mathematics
A.B., Catholic University of America, 1961; M.A., Brooklyn College, 1966;
Ph.D., Michigan State University, 1971. Professor.
- MURRAY, RANDALL L. (1977) Journalism
B.S., Ohio University, 1960; M.S., 1961; Ph.D., University of Minnesota,
1973. Professor.
- MUSSULMAN, RONALD (1986) Mechanical Engineering
B.S., University of Illinois, 1965; M.S., 1967; Ph.D., 1973. Professor and
Department Head. Registered Professional Engineer, Montana.
- MYERS, LEONARD D. (1984) Computer Science
B.S., Illinois State University, 1963; M.S., 1966; Ph.D., University of Kansas,
1977. Professor.
- NAFISI, AHMAD (1983) Electronic and Electrical Engineering
B.S., Arya Mehr University of Technology, Iran, 1975; M.S., University of
Southern California, 1977; Ph.D., 1983. Professor.
- NAHVI, MAHMOOD (1987) Electronic and Electrical Engineering
B.S., University of Teheran, 1959; M.S., University of Michigan, 1963;
Ph.D., Massachusetts Institute of Technology, 1967. Professor
- NAKAMURA, RAYMOND M. (1980) Physical Education and Kinesiology
B.S., Northern Illinois University, 1965; M.S. 1967; M.S., DePaul
University, 1980; Ph.D., University of Toledo, 1974. Professor.
- NAKAMURA, ROYDEN (1978) Biological Sciences
B.A., University of Hawaii, 1961; M.S., 1965; Ph.D., University of British
Columbia, 1970. Professor.
- NARETTO, EDWARD M. (1979) Administration and Finance
B.S., California State Polytechnic College, 1967. Director, Facilities Services.
- NEEL, PAUL R. (1962) College of Architecture and Environmental Design
B.S., California State Polytechnic College, 1958; B.Arch., University of
Southern California, 1962; M.Arch., University of Sheffield, 1969. Dean and
Professor. Registered Architect, California. Fellow in the American Institute of
Architects.
- NEGRANTI, ROBERT M. (1974) Student Affairs
B.S., San Jose State College, 1967. Employee Assistance Program Specialist.
- NELSON, LAWRENCE H. (1972) Mechanical Engineering
B.S., California Institute of Technology, Pasadena, 1958; M.S., University of
California, Davis, 1968; Ph.D., 1972. Professor.
- NELSON, LINDEN L. (1970) Psychology and Human Development
B.A., University of Northern Iowa, 1966; Ph.D., University of California, Los
Angeles, 1970. Professor.
- NEUBERT, ROD (1978) Associated Students, Inc.
B.S., California State Polytechnic College, 1971; M.A., California
Polytechnic State University, San Luis Obispo, 1979. Director, Program
Management.
- NICOVICH, RALPH R. (1978) Enrollment Support Services
B.S., California Polytechnic State University, San Luis Obispo, 1975; M.S.,
1983. Systems Specialist and OLAN Administrator.
- NIKU, SAEED B. (1983) Mechanical Engineering
B.S., Tehran Polytechnic University, 1975; M.S., Stanford University, 1976;
Ph.D., University of California, Davis, 1982. Professor. Registered
Professional Engineer, California.
- NOBLE, WILLIAM E. (1973) Ornamental Horticulture
B.S., University of Maryland, 1964; M.S., 1969; Ph.D., University of
Florida, 1974. Professor.
- NORDEEN, RONALD D. (1991) University Relations and Development
B.A., Pomona College, 1954. Director, Gift Planning/Endowments.
- NOVAK, MATTHEW S. (1989) English
B.S., Cleveland State University, 1974; B.A., 1976; M.A., 1978; Ph.D.,
Case Western Reserve University, 1989. Associate Professor.
- NOWATZKI, EDWARD A. (1989) Civil and Environmental Engineering
B.A., St. Joseph's College, 1957; B.C.E., Manhattan College, 1962;
M.S.C.E., University of Arizona, 1965; Ph.D., 1966. Professor and
Department Chair. Registered Professional Engineer.
- NOYES, O. ROBERT (1974) Food Science and Nutrition
B.A., Norwich University, 1963; M.Ed., University of Georgia, 1970; Ph.D.,
1974. Professor.
- NULMAN, DENNIS M. (1977) University Center for Teacher Education
B.A., University of San Diego, 1970; M.Ed., 1972; Ph.D., University of
Southern California, 1977. Professor.
- OCHS, NANCY C. (1977) Agribusiness
B.S., St. Louis University, 1966; M.Acct., University of Arizona, 1975.
Professor. Certified Public Accountant, Certified Financial Planner.
- OFFERMANN, GENE P. (1970) Crop Science
B.S., Southern Illinois University, 1964; M.S., 1965; Ph.D., University of
California, Davis, 1970. Professor.
- O'KEEFE, TIMOTHY G. (1983) Natural Resources Management
B.S., New York State College of Forestry, 1955; M.F., 1957; M.A., Northern
Arizona University, 1973; Ph.D., 1977. Professor. I.S.A. Certified Arborist,
California.
- OLDS, ALEXIS S. (1988) Speech Communication
B.A., San Jose State University, 1975; M.A., 1980; Ph.D., University of
Utah, 1989. Assistant Professor.
- OLIVER, S. RONALD (1988) Computer Science
B.A., Morningside College, 1970; M.S., University of Kansas, 1975; Ph.D.,
Colorado State University, 1988. Associate Professor.
- O'NEIL, THOMAS D. (1973) Mathematics
A.B., San Diego State College, 1966; M.A., 1968; Ph.D., University of
Wyoming, 1969. Professor.
- O'NEILL, GERTRUDIS M. (1972) University Library
B.A., Inter-American University, Puerto Rico, 1955; M.F.A., University of
Cincinnati, 1962; M.L.S., Western Michigan University, 1967; additional
graduate study, Art Academy of Cincinnati. Senior Assistant Librarian.
- OPAVA-STITZER, SUSAN (1993) Research and Graduate Programs
B.S., College of Mt. St. Vincent, New York, 1968; Ph.D., University of
Michigan, 1972. Dean.
- ORROCK, JILL (1983) Intercollegiate Athletics
B.Sc., California Polytechnic State University, San Luis Obispo, 1979; M.A.,
1985. Head Coach.
- ORTH, MICHAEL P. (1967-69) (1970) English
B.A., University of California, Santa Barbara, 1959; M.A., San Francisco
State College, 1963; Ph.D., Claremont Graduate School, 1974. Professor.
- ORTIZ, MARIA E. (1972) Biological Sciences
B.S., Southwest Texas State University, 1968; M.A., 1970; Ph.D., Texas
Woman's University, 1973. Professor.
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- OSBALDESTON, ROGER J. (1972).....Landscape Architecture
Diploma in Architecture, School of Architecture, Nottingham, England,
1957; M.L.A., University of Pennsylvania, 1961. Professor.
- O'TOOLE, FREDERICK J. (1972)Philosophy
B.A., University of California, Los Angeles, 1966; M.A., University of
California, Davis, 1968; Ph.D., 1972. Professor.
- OWENS, ANN (1992)Philosophy
B.A., Marquette University, 1983; M.A., 1987; M.A., University of
Washington, 1989; Ph.D., 1992. Assistant Professor.
- OZAWA, KENNETH S. (1963)..... Physics
B.S., John Carroll University, 1959; M.S., 1960; Ph.D., University of Kansas,
1975. Professor.
- PAGE, BRIAN, CPT. (1994)Military Science
B.A., SUNY College at Potsdam, 1987.
- PAGE, P. LANE (1963) University Library
B.A., University of Mississippi; M.S., Louisiana State University, 1963; M.A.,
California Polytechnic State University, San Luis Obispo, 1984. Associate
Librarian.
- PALMER, KENNETH F. (1984) University Center for Teacher Education
B.S., Iowa State University, 1964; M.S., 1969; Ph.D., 1972. Professor.
- PANETTA, DANIEL L. (1986) Architecture
B.S., California Polytechnic State University, San Luis Obispo, 1976; M.
Arch., University of California, Berkeley, 1986. Associate Professor.
Registered Landscape Architect, California.
- PAPAKYRIAZIS, ARTEMIS (1982)..... Economics
B.A., Athens School of Political Science, 1962; M.A., University of
California, Santa Barbara, 1969; Ph.D., University of California, Riverside,
1982. Professor and Department Head.
- PAPAKYRIAZIS, PANAGIOTIS A. (1971) Economics
B.A., Athens School of Economics and Business Science, 1964; Ph.D.,
University of California, San Diego, 1974. Professor.
- PARKER, LEE R. (1974).....Biological Sciences
B.S., Brigham Young University, 1966; M.S., 1968; Ph.D., Michigan State
University, 1976. Professor.
- PATTEE, ROBERT K. (1991) Administration and Finance
B.S., Texas A&M, 1976. Associate Director, Plant Operations.
- PATTERSON, ANDRE (1994).....Intercollegiate Athletics
B.A., University of Montana, 1983. Head Coach.
- PATTERSON, WILLIAM B. (1977).....Mechanical Engineering
B.S., U.S. Naval Academy, 1962; M.S., Air Force Institute of Technology,
1972. Associate Professor.
- PATTON, LINDA J. (1991)Mathematics
B.A., University of California, San Diego, 1985; M.A., 1987; Ph.D., 1991.
Assistant Professor.
- PAUTZ, ROLAND K. (1959) Animal Science
B.S., Oregon State College, 1957; M.S., Oregon State University, 1968.
Professor.
- PEACH, DAVID (1987).....Management
B.Sc., Ohio University, 1962; M.B.A., 1964; D.B.A., Harvard University,
1969. Professor.
- PECK, ROXY L. (1979) Statistics
B.A., University of California, Riverside, 1972; Ph.D., 1979. Professor and
Department Chair.
- PEDERSEN, MARY E. (1981) Food Science and Nutrition
B.A., University of California, Santa Barbara, 1973; M.S., University of
California, Los Angeles, 1976; Ph.D., 1980. Professor.
- PEREZ, MARINA E. (1975)..... Health Services
B.S., University of the Philippines, 1961. N.P., California Polytechnic State
University, San Luis Obispo, 1976. Nurse Practitioner.
- PERLICK, WALTER W. (1979).....Business Administration
B.S., M.S., Northern Illinois University, 1965; Ph.D., Pennsylvania State
University, 1973. Professor.
- PERRYMAN, ELIZABETH K. (1972)Biological Sciences
B.S., Memphis State University, 1964; M.S., Texas Technological College,
1967; Ph.D., University of Arizona, 1972. Professor.
- PETERS, RALPH A. (1969) Physics
B.S., Georgetown University, 1949; M.S., Pennsylvania State University,
1951; Ph.D., Fordham University, 1967. Professor.
- PEZO-SILVA, ARMANDO A. (1973)..... Student Academic Services
B.S., California State Polytechnic College, 1970; M.A., California
Polytechnic State University, San Luis Obispo, 1974; M.S., 1979. Director.
- PHILLIPS, JOHN C. (1974)Crop Science
B.S., Washington State University, 1967; M.S., Colorado State University,
1969; Ph.D., Oregon State University, 1974. Professor.
- PHILLIPS, PETER K. (1968) Administration and Finance
B.S., California State Polytechnic College, 1959. Architectural Coordinator.
- PIIRTO, DOUGLAS D. (1985) Natural Resources Management
B.S., University of Nevada, Reno, 1970; M.S., Colorado State University,
1971; Ph.D., University of California, Berkeley, 1977. Professor. Registered
Professional Forester, California.
- PILLSBURY, NORMAN H. (1974) Natural Resources Management
B.S., Humboldt State College, 1968; M.S., Humboldt State University, 1972;
Ph.D., Colorado State University, 1976. Professor and Department Head.
Registered Professional Forester, California.
- PINARD, LEO W., II (1970).....Social Sciences
B.A., University of Santa Clara, 1962; M.A., University of Notre Dame,
1963; Ph.D., 1971. Professor.
- PLUMB, TIMOTHY R. (1981) Natural Resources Management
B.S., Oregon State University, 1954; M.S., University of California, Berkeley,
1959; Ph.D. University of California, Riverside, 1970. Professor. Registered
Professional Forester, California.
- PLUMMER, WILLIAM E. (1979)..... Animal Science
B.S., North Carolina State University, 1970; M.S., 1976; Ph.D., Utah State
University, 1979. Professor.
- POHL, JENS G. (1973) Architecture
B.Arch., University of Melbourne, Australia, 1964; M.Bldg.Sci., University of
Sydney, 1967; Ph.D., 1970. Professor. Registered Architect, Australia.
- POKORNY, CORNEL K. E. (1983)Computer Science
M.S., Technical University Vienna, Austria, 1973; Ph.D., 1977. Professor.
- POLING, JOHN E. (1976) Physics
B.A., University of Chicago, 1965; M.S., University of Iowa, 1969; Ph.D.,
1975. Professor.
- POLINSKY, ELLEN B. (1986) Career Services
B.A., University of Connecticut, 1960; M.A., 1966. Career Counselor.
- POURAGHABAGHER, A. REZA (1979)Industrial and Manufacturing
Engineering
B.S., University of Colorado, 1972; M.S., University of California, 1973;
Ph.D. University of Iowa, 1977. Professor. Certified in Production and
Inventory Management (CPIM).
- PRESTON, WILLIAM L. (1980).....Social Sciences
B.A., Fresno State College, 1971; M.A., California State University, Fresno,
1973; Ph.D., University of Oregon, 1979. Professor.
- PRITCHARD, EILEEN ELLEN (1973) University Library
B.A., California State College, Chico, 1961; Ph.D., University of Kansas,
1967; M.L., Emporia State University, 1972. Associate Librarian.
- PROCTOR, ANDREW J. (1973).....Physical Education and Kinesiology
B.S., California State Polytechnic College, 1970; M.S., 1971; Ph.D.,
University of Utah, 1978. Professor.
- PROUT, DONALD (1990) University Foundation
B.A., Long Beach State, 1966; M.B.A., University of North Dakota, 1978.
Administrator, Sponsored Programs.
- QUINLAN, CHARLES W. (1966) Architecture
B.Arch., Cornell University, 1959; M.A., University of Sheffield, 1974.
Professor. Registered Architect, California.
- RAGSDALE, DAVID O. (1991) Administration and Finance
B.S., California Polytechnic State University, San Luis Obispo, 1984.
Registered Environmental Health Specialist, Environmental Safety Officer.

- RAINEY, PAUL E. (1987).....College of Engineering
B.S.M.E., B.S.Met.E., Purdue University, 1967; M.S., Massachusetts Institute
of Technology, 1968; Ph.D., Texas A & M University, 1981. Professor,
Materials Engineering, and Associate Dean. Registered Professional Engineer,
Texas.
- RAMIREZ, RICHARD M. (1975) Administration and Finance
B.B.A., New Mexico State University, 1971. Director, Budget Planning and
Administration.
- RANDAZZO, ANTHONY JAMES (1977)Industrial Technology
B.A., San Jose State College, 1965; M.A., 1968; Ph.D., Washington State
University, 1976. Professor.
- RAWLINGS, DON (1980)Mathematics
B.S., Arizona State University, 1974; M.A., University of California, San
Diego, 1976; Ph.D., 1978. Professor.
- REGAN, CYNTHIA L. (1989).....Home Economics
B.S., California State Polytechnic College, 1970; M.S., University of
Wisconsin, Stout, 1985. Assistant Professor.
- REGIER, RONALD (1987).....College of Liberal Arts
B.A., University of Puget Sound, 1973; M.F.A., Michigan State University,
1977; M.A., University of Wisconsin, 1987. Director, Center for the Arts.
- REIF, GARY D. (1967)..... Dairy Science
B.S., Kansas State University, 1962; M.S., University of Nebraska, 1964;
Ph.D., Iowa State University, 1967. Professor.
- REYNOLDS, NANCY J. (1986)..... Administration and Finance
B.S., California Polytechnic State University, San Luis Obispo, 1977.
Assistant Director, Fiscal Services-Accounts Management.
- REYNOLDS, ROBERT G. (1963).....Art and Design
B.P.A., Art Center College of Design, Los Angeles, 1962; M.A., California
Polytechnic State College, San Luis Obispo, 1970. Professor.
- REYNOSO, WENDY DEMKO (1978)College of Liberal Arts
B.A., California Polytechnic State University, San Luis Obispo, 1978; M.A.,
1984. Academic Counselor.
- RICE, MARILYNN F. (1977) Psychology and Human Development
A.B., University of California, Los Angeles, 1960; M.Ed., California State
University, Northridge, 1969; Ph.D., University of California, Santa Barbara,
1977. Professor. Licensed Psychologist, California.
- RICE, THOMAS J., JR. (1981).....Soil Science
B.S., University of Wisconsin, Madison, 1974; M.S., Montana State
University, 1976; Ph.D., North Carolina State University, 1981. Professor.
Certified Professional Soil Scientist.
- RICE, WALTER E. (1964)..... Economics
B.A., San Francisco State College, 1960; M.A., 1963; M.A., Claremont
Graduate School, 1970; Ph.D., 1973. Professor.
- RICHARDS, THOMAS L. (1969).....Biological Sciences
B.S., California State College, Long Beach, 1964; M.A., 1966; Ph.D.,
University of Maine, 1969. Professor.
- RIEDLSPERGER, MAX E. (1969)History
A.B., Wabash College, 1959; M.A., University of Michigan, 1961; Ph.D.,
University of Colorado, 1969. Professor.
- RIENER, KENNETH (1983).....Business Administration
B.S., University of Idaho, 1968; M.S., Purdue University, 1969; Ph.D.,
1976. Professor.
- RIFE, WILLIAM C. (1977).....Chemistry
B.A., North Central College, 1956; Ph.D., University of Illinois, 1960.
Professor.
- RIGGINS, RHONDA L. (1972).....Biological Sciences
B.S., Austin Peay State College, 1966; M.S., Iowa State University, 1969;
Ph.D., 1972. Professor.
- RIHAL, SATWANT S. (1969).....Architectural Engineering
B.S., University of Delhi, India, 1961; M.S., University of Minnesota, 1964;
Ph.D., University of New Mexico, 1969. Professor. Registered Civil Engineer,
California.
- RISSER, JOSEPH C. (1982)..... Administration and Finance
B.A., Humboldt State College, 1971; M.A., Humboldt State University,
1978. Director, Public Safety Services.
- ROACH, DAVID M. (1966) Physics
B.S., South Dakota School of Mines and Technology, 1961; M.S., 1963;
Ph.D., Oregon State University, 1974. Professor.
- ROBERTS, GREGORY (1990)..... Student Academic Services
B.A., Idaho State University, 1978; M.Ed., University of Idaho, 1979.
Director, Student Support Services.
- ROBISON, JOHN C. (1985)..... Accounting
B.A., Whittier College, 1968; M.B.A., University of California, Los Angeles,
1971; Ph.D., University of Arizona, 1982. Professor and Department Head.
Certified Public Accountant.
- ROCKMAN, ILENE F. (1975) University Library
B.A., University of California, Los Angeles, 1972; M.S., University of
Southern California, 1974; M.A., California Polytechnic State University, San
Luis Obispo, 1978; Ph.D., University of California, Santa Barbara, 1985.
Librarian and Interim Associate Dean.
- RODGER, JAMES A. (1976)Construction Management
B.Bldg.Cstr., University of Florida, 1970; M.S., 1977. Professor and
Department Head. Certified General Contractor, Florida.
- RODRIGUEZ, LUCY (1987) Academic Records
B.A., California Polytechnic State University, San Luis Obispo, 1987; M.A.,
1990. Associate Director.
- ROGERS, JOHN C. (1986).....Business Administration
B.S., Point Park College, 1970; M.B.A., Pennsylvania State University, 1972;
Ph.D., Virginia Polytechnic Institute and State University, 1979. Professor
and Department Head.
- ROGERS, JOHN M. (1970) Statistics
B.S., Marion College, 1962; M.S., Kansas State University, 1966; Ph.D.,
Virginia Polytechnic Institute and State University, 1975. Associate Professor.
- ROGERS, ROBERT L. (1974)Engineering Technology
B.S., California Maritime Academy, 1969; M.S., Stanford University, 1972.
Professor. Registered Professional Engineer, California.
- ROGERS, ROLF E. (1975)..... Management
M.A., University of Washington, 1968; Ph.D., 1970. Professor.
- ROJAS-OVIEDO, RUBEN (1991) Aeronautical Engineering
B.S., Instituto Politecnico Nacional, 1976; M.S., North Carolina State
University, 1981; Ph.D., Auburn University, 1987; M.S., 1989. Assistant
Professor.
- ROME, KEVIN D. (1991)..... Residential Life and Education
B.A., Morehouse University, 1989; M.S., University of Georgia, 1991.
Academic Development Specialist.
- ROPER, SUSAN S. (1991)..... University Center for Teacher Education
B.A., University of California, Berkeley, 1963; M.A., Stanford University,
1968; Ph.D., 1971. Professor and Center Director.
- ROSENFELD, STANLEY (1979)..... Administration and Finance
B.A., Occidental College, 1970. Assistant Director, Fiscal Services-Payment
Management.
- ROSENTHAL, BIANCA (1971) Foreign Languages and Literatures
B.S., University of Washington, 1952; M.A., 1966; Ph.D., 1970. Professor.
- ROSSI, RICHARD J. (1991) Statistics
B.A., California State University, Sacramento, 1978; M.S., Iowa State
University, 1980; Ph.D., Oregon State University, 1988. Assistant Professor.
- ROWELL, ROBERT (1991) Intercollegiate Athletics
B.Sc., California Polytechnic State University, San Luis Obispo, 1990.
Assistant Athletic Director, Business Operations.
- RUEHR, THOMAS A. (1974)..... Soil Science
B.S., Ohio State University, 1966; M.S., Iowa State University, 1970; Ph.D.,
Colorado State University, 1976. Professor.
- RUGGLES, JOANNE BEAULE (1973).....Art and Design
B.F.A., Ohio State University, 1968; M.F.A., 1970. Professor.
- RUGGLES, PHILIP K. (1966) (1971)Graphic Communication
B.S., West Virginia Institute of Technology, 1965; M.S., South Dakota State
University, 1966. Professor.
- RUSSELL, CRAIG H. (1982) Music
B.M., University of New Mexico, 1973; M.M., 1976; Ph.D., University of
North Carolina, 1981. Professor.

- RUSSELL, JOHN G. (1968) Music
B.A., Fresno State College, 1959; M.A., California State University, Chico,
1968. Professor.
- RUTHERFORD, ROBERT T. (1974) Animal Science
B.S., University of California, Davis, 1970; M.S., California Polytechnic State
University, San Luis Obispo, 1976. Professor.
- RYAN, KATHLEEN A. (1981) Psychology and Human Development
B.A., San Diego State University, 1975; M.A., Bowling Green State
University, 1978; Ph.D., 1980. Professor.
- RYAN, L. DIANE (1973) Financial Aid
B.A., California Polytechnic State University, San Luis Obispo, 1973; M.A.,
1976; Ph.D., University of California, Los Angeles, 1993. Director of
Financial Aid.
- RYUJIN, DONALD H. (1989) Psychology and Human Development
B.A., Stanford University, 1968; M.A., University of Michigan, 1972; Ph.D.,
1983. Associate Professor.
- SABOL, JOSEPH E. (1972) College of Agriculture and Agricultural Education
B.S., Fresno State College, 1963; M.Ed., University of California, 1965;
Ph.D., Colorado State University, 1976. Professor and Director of Outreach
Services.
- SAENZ, RICHARD A. (1980) Physics
A.B., University of California, Berkeley, 1972; M.S., Cornell University,
1975; Ph.D., 1977. Professor.
- SALTZMAN, JUDY D. (1975) Philosophy
B.A., San Jose State College, 1963; M.A., University of California, Berkeley,
1965; M.A., 1973; Ph.D., University of California, Santa Barbara, 1977;
Fulbright scholar, Freie Universitat, Berlin, 1970-71. Professor.
- SCHAFER, CAROLE L. (1987) Residential Life and Education
B.A., Alfred University, 1985; M.S., 1987. Assistant Director.
- SCHAFFNER, DAVID J. (1972) Agribusiness
B.S., University of California, Davis, 1964; M.B.A., University of California,
Berkeley, 1970; M.S., California Polytechnic State University, San Luis
Obispo, 1978; Ph.D., Golden Gate University, 1980. Professor.
- SCHNUPP, ALVIN J. (1988) Theatre and Dance
B.S., Millersville State College, 1974; M.A., Bowling Green State University,
1979; Ph.D. University of California, Los Angeles, 1985. Associate Professor
and Department Head.
- SCHULTZ, NED W. (1976) Psychology and Human Development
B.S., Pennsylvania State University, 1973; M.A., 1975; Ph.D., Ohio State
University, 1976. Professor.
- SCHUMANN, THOMAS G. (1971) Physics
B.S., California Institute of Technology, 1958; M.A., University of California,
Berkeley, 1960; Ph.D., 1965. Professor.
- SCOTT, JACK F. (1967) Agribusiness
B.S., California State Polytechnic College, 1961; M.A., 1967. Professor.
- SCOTT, KENNETH C. (1975) Agribusiness
B.S., Brigham Young University, 1970; Ph.D., Washington State University,
1975. Professor.
- SCOTTO, KENNETH C. (1970) Animal Science
B.S., California State Polytechnic College, 1966; M.S., University of Nevada,
1969. Professor.
- SCRIVEN, TALMAGE ERNEST (1980) Philosophy
B.A., University of South Florida, 1976; M.A., 1977; Ph.D., University of
Southern California, 1980. Professor.
- SEIFODDINI, AHMAD K. (1984) Industrial and Manufacturing Engineering
B.S., Abadan Institute of Technology, 1965; M.S., Oklahoma State
University, 1973; Ph.D., 1976. Professor.
- SEIM, EDWIN C. (1978) Crop Science
B.S., University of Missouri, 1954; M.S., University of Minnesota, 1966;
Ph.D., 1970. Professor.
- SELBY, MICHAEL J. (1991) Psychology and Human Development
B.S., University of California, Santa Barbara, 1971; M.S., California
Polytechnic State University, San Luis Obispo, 1981; Ph.D., Memphis State
University, 1988. Assistant Professor. Licensed Psychologist, California.
- SENA, JAMES (1987) Management
B.S., Xavier University of Ohio, 1961; M.B.A., 1964; M.S., University of
Dayton, 1968; D.B.A., University of Kentucky, 1972. Professor.
- SENNETT, ROBERT E. (1970) Civil and Environmental Engineering
B.S., University of Pennsylvania, 1959; M.S., 1961; Ph.D., 1964. Professor.
Registered Professional Engineer, California.
- SETTLE, ALLEN K. (1970) Political Science
B.A., University of California, Santa Barbara, 1966; M.A., 1967; Ph.D.,
1970. Professor.
- SEU, ANNA B. (1993) Information Systems
B.A., University of Southern California, 1972. Director, Multimedia
Development.
- SHABAN, ALI O. (1984) Electronic and Electrical Engineering
B.S., University of Tripoli, 1974; M.S., University of Southern California,
1978; Ph.D., Oregon State University, 1985. Associate Professor.
- SHAFFER, MARY K. (1980) Information Systems
B.A., Sonoma State University, 1974. Assistant to the Vice President.
- SHAFFER, RICHARD A. (1974) Social Sciences
B.A., Stanislaus State College, 1971; M.A., University of Notre Dame, 1974;
Ph.D., 1975. Professor.
- SHAH, RAMESH T. (1969) Mechanical Engineering
B.E., Maharaja Sayajirao University of Baroda, India; Dr. Ing., Hochschule
Für Schwermaschinenbau, Magdeburg, East Germany, 1959. Professor.
Registered Professional Engineer, California.
- SHANI, ABRAHAM B. (Rami) (1983) Management
B.A., University of Tel Aviv, 1972; M.A., 1978; Ph.D., Case Western
Reserve University, 1981. Professor and Department Head.
- SHANK, CAROLYN B. (1974) Natural Resources and Management
B.S., California State Polytechnic College, 1969; M.S., 1975; Ed.D.,
University of Utah, 1981. Professor.
- SHARP, HARRY, JR. (1975) College of Liberal Arts
A.B., College of the Pacific, 1959; M.S., Purdue University, 1961; Ph.D.,
1967. Professor and Associate Dean.
- SHEIK, HABIB (1967) English
B.S., Fresno State College, 1959; A.B., 1960; M.A., California State
Polytechnic College, 1961; M.A., University of California, Los Angeles,
1966; Ph.D., University of Nebraska, 1979. Professor.
- SHELTON, MARK D. (1982) Crop Science
B.S., University of Idaho, 1977; M.S., Purdue University, 1980; Ph.D., Utah
State University, 1989. Professor. Registered Professional Entomologist.
- SHEMENSKE, DONALD (1982) University Foundation
B.A., St. Mary's College, 1979. Director, Financial Services.
- SHIBATA, MARTIN (1990) Career Services
B.A., University of California, Los Angeles, 1975; M.P.A., California State
University, Los Angeles, 1983; additional graduate work, University of
Southern California, 1985. Assistant Director.
- SHIERS, ALDEN F. (1975) Economics
B.S., University of Maine, 1967; Ph.D., University of California, Santa
Barbara, 1977. Associate Professor.
- SHOCKLEY, STEVEN B. (1985) University Relations and Development
B.S., University of Alabama, 1971. Director, Alumni Relations.
- SILVESTRI, MICHAEL G. (1978) Chemistry
B.S., University of California, Santa Barbara, 1973; Ph.D., University of
California, Santa Cruz, 1977. Professor.
- SIMEK, JAN. W. (1977) Chemistry
B.A., Kalamazoo College, 1970; M.S., Stanford University, 1971; Ph.D.,
1975. Professor.
- SIMMONS, JAMES E. (1966) English
B.A., University of California, Santa Barbara, 1959; M.A., University of
Wisconsin, 1960; Ph.D., 1966. Professor.
- SIMON, RICHARD K. (1988) English
B.A., University of Michigan, 1967; M.A., 1968; Ph.D., Stanford University,
1977. Associate Professor.
- SINGLETON, DAVID R., CPT. (1988) Military Science
B.A., University of South Florida, 1978; M.A., 1980.

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- SLACK, DARLENE L. (1983)..... University Relations and Development
B.A., California State College, Northridge, 1969. Director of
Communications.
- SLEEPER, CHARLES (1992)..... Intercollegiate Athletics
B.S., Grand Valley State University, 1983; M.S., St. Thomas University,
1986. Assistant Athletic Director, Athletic Development.
- SLEM, CHARLES M. (1975)..... Psychology and Human Development
B.A., University of California, Los Angeles, 1968; M.A., 1972; Ph.D.,
Wayne State University, 1975. Professor.
- SMIDT, ROBERT K. (1978)..... Statistics
B.S., Manhattan College, 1971; M.S., Rutgers University, 1973; Ph.D.,
University of Wyoming, 1976. Professor.
- SMITH, BRENDA (1989)..... Crop Science
B.S., University of California, Davis, 1983; M.S., California State University,
Fresno, 1986; Ph.D., Oklahoma State University, 1989. Assistant Professor.
- SMITH, DALE A. (1973)..... Animal Science
B.S., University of California, Davis, 1971; D.V.M., 1973. Professor.
- SMITH, DOUGLAS B. (1977)..... English
B.A., Johns Hopkins University, 1969; M.A., Fairfield University, 1975;
Ph.D., Rensselaer Polytechnic Institute, 1979. Professor.
- SMITH, GERALD L. (1980)..... Landscape Architecture
B.S., Iowa State University, 1961; M.L.A., University of Illinois, 1971.
Professor. Registered Landscape Architect, Utah.
- SMITH, KENT D. (1981)..... Statistics
B.A., University of Utah, 1967; M.S., Air Force Institute of Technology,
1969; M.S., University of California, Riverside, 1979; Ph.D., 1981.
Professor.
- SMITH, NELSON L., III (1962)..... Industrial Technology
B.S., Lowell Technological Institute, 1960; M.S., 1962; additional graduate
study, University of Iowa. Professor.
- SMITH, PATRICK (1976)..... University Foundation
B.A., University of Central Florida, 1975. Director, Visual Education
Productions.
- SMITH, TERRY L. (1980)..... Soil Science
B.S., University of Nebraska, Lincoln, 1972; M.S., 1975; Ph.D., Iowa State
University, 1980. Professor and Department Head.
- SMITH-HEIMER, MICHAEL A. (1992)..... City and Regional Planning
B.U.P., University of Cincinnati, 1975; M.U.R.P., University of California,
Berkeley, 1983; M.B.A., 1984; Ph.D., 1992. Associate Professor.
- SNETSINGER, JOHN (1970)..... History
A.B., University of California, Los Angeles, 1963; M.A., University of
California, Berkeley, 1966; Ph.D., Stanford University, 1969; additional
graduate study, Stanford School of Law. Professor.
- SOENEN, LUC A. (1989)..... Business Administration
B.S., Leuven University, Belgium, 1970; M.B.A., Cornell University, 1972;
D.B.A., Harvard University, 1977. Professor.
- SOMAYAJI, S. (1979)..... Civil and Environmental Engineering
B.E., Mysore University, 1968; M.Tech., 1974; M.S., South Dakota School
of Mines and Technology, 1975; Ph.D., University of Illinois, Chicago,
1979. Professor. Registered Professional Engineer, California.
- SOMPPI, SUSAN (1978)..... Student Academic Services
B.S., University of Texas, 1970; M.A., California Polytechnic State
University, San Luis Obispo, 1978. Academic Adviser/Instructor.
- SPILLER, ROBERT (1989)..... Animal Science
B.S., California State Polytechnic College, 1969; M.S., 1971; Ph.D., Oregon
State University, 1974. Professor.
- SPILLER, WILLIAM T. (1991)..... Music
B.M., University of Washington, 1981; M.M., Indiana University, 1983;
D.M.A., University of Southern California, 1991. Assistant Professor.
- SPIRIDIGLIOZZI, NICHOLAS, CPT. (1993)..... Military Science
B.S. Christopher Newport College, 1984.
- STALEY, CLINTON A. (1988)..... Computer Science
B.A., Principia College, 1980; M.S., University of California, Santa Barbara,
1982; Ph.D., 1987. Professor.
- STALLARD, MARY L. (1965)..... Physical Education and Kinesiology
B.A., Fresno State College, 1957; M.S., University of Washington, 1965;
Ph.D., University of Utah, 1974. Professor.
- STANTON, GEORGE C. (1981)..... Psychological Services
B.A., Lake Forest College, 1963; M.A., Cornell University, 1968; Ph.D.,
Stanford University, 1980. Test Officer.
- STEARNS, DANIEL J. (1986)..... Computer Science
B.S., University of California, 1965; M.S., California Polytechnic State
University, San Luis Obispo, 1974. Associate Professor.
- STEBBINS, MICHAEL W. (1982)..... Management
B.S., University of California, Berkeley, 1967; M.B.A., 1968; Ph.D., 1973.
Professor.
- STEFANCO, CAROLYN J. (1990)..... History
B.A., University of Colorado, 1979; M.A., S.U.N.Y., Binghamton, 1981;
Ph.D., Duke University, 1987. Assistant Professor and Director of Women's
Studies.
- STEWART, PATRICIA A. (1971)..... Student Academic Services
B.S., California State Polytechnic College, 1970; M.A., California
Polytechnic State University, San Luis Obispo, 1972. Coordinator, Academic
Skills Center.
- STIPICEVICH, JOHN (1985)..... Associated Students, Inc.
B.A., San Jose State University, 1985. Director of Operations.
- STIRLING, JEAN E. (1979)..... Admissions
B.S., California Polytechnic State University, San Luis Obispo, 1989.
Admissions Officer.
- STOKES, CLIFFORD (1988)..... Animal Science
B.S., Ohio State University, 1975; M.S., 1976; Ph.D., Colorado State
University, 1989. Associate Professor.
- STONEMAN, PATRICIA-ANN (1990)..... Extended Education
B.A., California State University at Northridge, 1974; M.A., 1978. Associate
Director.
- STOVER, VICKI R. (1969)..... Administration and Finance
B.S., California Polytechnic State University, San Luis Obispo, 1979; M.B.A.,
1986. Administration and Finance Associate.
- STOWE, KEITH S. (1971)..... Physics
B.S., Illinois Institute of Technology, 1965; M.S., University of California,
San Diego, 1967; Ph.D., 1971. Professor.
- STRAHL, RICHARD A. (1985)..... Industrial and Manufacturing Engineering
B.S., Michigan Technological University, 1966; M.S., 1969. Professor.
Registered Professional Engineer, Ohio.
- STRICKMEIER, H. BERNARD (1970)..... Mathematics
B.S., Texas Lutheran College, 1962; M.A., University of Texas, 1967; Ph.D.,
1970. Professor.
- STROHMAN, ROLLIN D. (1969)..... Agricultural Engineering
B.S. (Agricultural Engineering), B.S. (Agricultural Science), University of
Illinois, 1962; M.S., University of Iowa, 1965; Ph.D., Purdue University,
1969. Professor.
- STRONG, CHARLES W. (1971)..... English
B.S., Arizona State University, 1965; M.A., University of Missouri, 1969.
Associate Professor.
- STUBBS, DANIEL F. (1963-66) (1968)..... Computer Science
B.S., Purdue University, 1960; M.S., Rensselaer Polytechnic Institute, 1962;
Ph.D., 1973. Professor.
- STULTZ, W. FRED (1977)..... Psychology and Human Development
B.A., University of Southern Colorado, 1970; M.S., Purdue University,
1973; Ph.D., 1974. Professor.
- SUCHAND, GEORGE J. (1971)..... Social Sciences
B.A., Louisiana State University, 1958; M.A., University of Florida, 1967;
Ph.D., University of Oklahoma, 1972; M.S., California Polytechnic State
University, San Luis Obispo, 1978. Professor.
- SUESS, MICHAEL H. (1975)..... Faculty Affairs
B.S., California Polytechnic State College, San Luis Obispo, 1970; M.S.,
1971; additional graduate study, Brigham Young University and La Verne
University. Director.
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- SUHR, MOON JA MINN (1969-71) (1972)..... Theatre and Dance
B.S., Ewha Women's University, Seoul Korea, 1963; M.A., University of Northern Colorado, 1969; Ph.D., Texas Woman's University, 1988.
Professor.
- SULLIVAN, EDWARD C. (1989) Civil and Environmental Engineering
B.S., Massachusetts Institute of Technology, 1966; M.S., 1967; Ph.D., University of California, Berkeley, 1971; M.B.A., John F. Kennedy University, 1987. Professor.
- SULLIVAN, GERALD J. (1968) English
B.A., University of Wichita, 1957; M.A., University of Oklahoma, 1959; Ph.D., 1964. Professor.
- SUN, CHENG (1989) Electronic and Electrical Engineering
B.S., National Taiwan University, Taiwan, 1958; M.S., Cornell University, 1962; Ph.D., 1965. Professor.
- SUNGAR, NILGUN (1989) Physics
B.S., Middle East Technical University, Turkey, 1979; Ph.D., University of Missouri, 1985. Assistant Professor.
- SUTLIFF, DALE A. (1973) Landscape Architecture
B.S.L.A., California State Polytechnic College, Pomona, 1965; M.R.P., University of Pennsylvania, 1973. Professor. Registered Landscape Architect, California.
- SWANSON, CLIFTON E. (1967) Music
B.A., Pomona College, 1963; M.M., University of Texas, 1965; additional graduate study, University of California. Professor and Department Head.
- SWARTZ, TERESA A. (1991) Business Administration
B.S., Clarion University of Pennsylvania, 1974; M.B.A., 1977; Ph.D., Ohio State University, 1981. Professor.
- SWEARINGEN, DON E. (1974) Architecture
B.Arch., Oklahoma State University, 1968; M.Arch., University of Illinois, 1972. Professor. Registered Architect, Arizona.
- SWIDERSKI, MICHAEL (1983) Natural Resources Management
B.S., University of Southern California, 1972; M.A., 1974; Ph.D., University of Oregon, 1981. Associate Professor.
- SYDNOR, WILLIAM E. (1981) Student Academic Services
B.A., Whittier College, 1971; M.A., University of California, Riverside, 1974; M.A., California Polytechnic State University, San Luis Obispo, 1986. Counselor, Academic Skills Center.
- TAKKEN, MEREDITH R. (1976) Financial Aid
B.A., California State College, Chico, 1971; M.A., California Polytechnic State University, San Luis Obispo, 1990. Pell Grant Program Manager.
- TANDON, SHYAMA (1983) Electronic and Electrical Engineering
B.S., Banaras University, India, 1965; M.S., University of Iowa, 1971; Ph.D., Texas A & M, 1976. Professor.
- TASKEY, RONALD D. (1977) Soil Science
B.S., University of Montana, 1970; M.S., 1972; Ph.D., Oregon State University, 1978. Professor. Certified Professional Soil Scientist; Certified Professional Soil Erosion and Sediment Control Specialist.
- TERRY, RAYMOND D. (1974) Mathematics
B.S., State University of New York, 1966; M.S., Michigan State University, 1968; Ph.D., 1972. Professor.
- THAYER, DAVID S. (1983) Theatre and Dance
M.F.A., University of California, San Diego, 1992. Assistant Professor.
- THOMPSON, RICHARD P. (1990) Natural Resources Management
B.S., Oklahoma State University, 1974; M.S., 1978; Ph.D., Texas A&M University, 1990. Associate Professor. Registered Professional Forester, California.
- THOMPSON, ROBERT C. (1981) Agribusiness
B.S., California State Polytechnic College, 1969; M.S., University of California, Davis, 1970; Ph.D., Colorado State University, 1990. Professor.
- TICE, RUSSELL L. (1965) Chemistry
B.S., Marshall University, 1960; Ph.D., University of California, Los Angeles, 1965. Professor.
- TONG, PHILLIP S. (1988) Dairy Science
B.S., University of California, Davis, 1977; M.S., Cornell University, 1982; Ph.D., 1986. Director, Dairy Products Technology Center.
- TORRES, EVELYN M. (1989) English
B.A., California Polytechnic State University, San Luis Obispo, 1978; M.A., 1983; Ph.D., University of California, San Diego, 1989. Assistant Professor.
- TOWLES, JAMES G. (1992) Associated Students, Inc.
B.S., University of Idaho, 1970. Director, Finance.
- TROXEL, PATRICIA (1990) English
B.A., Whitman College, 1978; M.A., University of California, Davis, 1981; M.A., Princeton University, 1983; Ph.D., 1986. Associate Professor.
- TROY, BERNARD A. (1970) University Center for Teacher Education
B.A., University of Notre Dame, 1957; S.T.L., Universidad Catolica de Chile, 1961; M.A., University of Notre Dame, 1965; Ph.D., University of Southern California, 1974. Professor.
- TRYON, BETTE W. (1976) Psychology and Human Development
B.S., University of Maryland, 1966; M.S., 1973; Ph.D., Syracuse University, 1976. Professor.
- TRYON, WALTER M. (1976) Landscape Architecture
B.S., Syracuse University, 1964; B.L.A., State University of New York, 1964; M.L.A., 1974. Professor. Registered Landscape Architect, Maryland and Massachusetts.
- TSENG, JAMES H. W. (1969) Electronic and Electrical Engineering
LL.B., National Taiwan University, 1950; LL.M. Southern Methodist University, 1957; B.S., Illinois Institute of Technology, 1964; M.S., 1966; Ph.D., Southern Methodist University, 1978. Professor. Registered Professional Engineer, Texas.
- TSO, JIN (1988) Aeronautical Engineering
B.S., National Taiwan University, 1971; M.S., 1973; Ph.D., Johns Hopkins University, 1983. Associate Professor.
- TURNQUIST, CARL E. (1989) Construction Management
B.S., University of Illinois, 1963; M.B.A., University of Florida, 1966. Professor.
- ULLERICH, STANTON G. (1984) Agribusiness
B.A., Buena Vista College, 1982; M.S., Iowa State University, 1984. Associate Professor.
- VALENCIA-LAVER, DEBRA (1991) Psychology and Human Development
B.S., University of California, Irvine, 1983; M.S., The Claremont Graduate School, 1988; Ph.D., 1992. Assistant Professor.
- VALLE, VICTOR (1992) Journalism
B.A., California State University, Long Beach, 1974; M.A., 1978; M.S.J., Northwestern University, 1981. Associate Professor.
- VANASUPA, LINDA S. (1991) Materials Engineering
B.S., Michigan Technological University, 1985; M.S., Stanford University, 1987; Ph.D., 1990. Assistant Professor.
- VANCE, ROBERT D. (1972) Food Science and Nutrition
B.S., Brigham Young University, 1966; M.S., Ohio State University, 1968; Ph.D., 1971. Professor.
- VAN EPS, JOHN (1974) Mathematics
B.A., University of California, Berkeley, 1965; Ph.D., 1969. Professor.
- VAN WYNGAARDEN, WILLEM L. (1965) Physics
B.S., McMaster University, 1961; M.S., University of Manitoba, 1964; Ph.D., Louisiana State University and A & M College, 1975. Professor.
- VELÁSQUEZ, GLORIA (1985) Foreign Languages and Literatures
B.A., University of Northern Colorado, 1978; M.A., Stanford University, 1980; Ph.D., 1985. Professor.
- VIGIL, SAMUEL A. (1982) Civil and Environmental Engineering
B.S., University of California, Berkeley, 1969; M.S., Texas A & M University, 1974; Ph.D., University of California, Davis, 1981. Professor. Registered Professional Engineer, California.
- VILKITIS, JAMES R. (1980) Natural Resources Management
B.S., Michigan State University, 1965; M.S., University of Idaho, 1968; Ph.D., University of Massachusetts, 1970; additional graduate study 1973-74. Professor.
- VILLEGAS, DANIEL J. (1987) Economics
B.S., University of Southern California, Los Angeles, 1972; A.M., Stanford University, 1975; Ph.D., 1979. Associate Professor.

- VIX, MARLIN DALE (1977) Agribusiness
B.S., San Jose State College, 1968; M.S., California Polytechnic State University, San Luis Obispo, 1977. Assistant Professor.
- WADDELL, JOSEPH JAMES (1976) University Library
B.A., California State College at San Bernardino, 1972; M.L.S. University of California, Los Angeles, 1975. Associate Librarian.
- WALCH, DAVID B. (1980) University Library
B.A., Eastern Oregon College, 1958; M.L.S., University of Illinois, 1962; Ph.D., University of Utah, 1973. Dean.
- WALKER, KENDRICK W. (1973) Philosophy
B.A., University of Southern California, 1965; M.A. 1969; Ph.D., 1974. Professor.
- WALKER, ROBERT E. (1983) Agricultural Engineering
B.S., California State Polytechnic College, 1968; M.S., Utah State University, 1978. Professor. Registered Professional Engineer, California and Colorado.
- WALL, LEONARD W. (1969) Physics
B.S., Louisiana Tech University, 1963; Ph.D., Iowa State University, 1969. Professor.
- WALL, MATTHIAS R. (1976) Construction Management
B.S., University of Wisconsin, 1962; M.B.A., 1972; Ph.D., Texas A & M, 1976. Professor.
- WALLACE, WILLIAM CARL (1970) Student Affairs
B.S., California State Polytechnic College, 1967; California Polytechnic State University, San Luis Obispo, M.A., 1973. Additional graduate study, University of California, Santa Barbara. Director, Campus Student Relations/Judicial Affairs.
- WALLER, JULIA R. (1983) Financial Aid
B.A., California State University, Sacramento, 1982; M.A., California Polytechnic State University, San Luis Obispo, 1987. Counselor.
- WALSH, DANIEL W. (1986) College of Engineering
B.S., Rensselaer Polytechnic Institute, 1973; M.S., 1976; Ph.D., 1985. Professor, Materials Engineering, and Associate Dean.
- WALTER, VIRGINIA R. (1974) Ornamental Horticulture
B.S., Ohio State University, 1970; M.S., 1972. Professor.
- WALTERS, DIRK R. (1969) Biological Sciences
B.S., Western Illinois University, 1965; M.A., Indiana University, 1966; Ph.D., 1969. Professor.
- WALTERS, ROBERT W. (1970) Student Life and Activities
B.A., California State College, Fullerton, 1962; M.A., California State Polytechnic College, 1971. Assistant Director.
- WARFIELD, DAVID L. (1975) Crop Science
B.S., University of California, Davis, 1966; M.S., 1968; Ph.D., Washington State University, 1973. Professor.
- WASSEL, GUSTAV N. (1980) Electronic and Electrical Engineering
B.S., California Institute of Technology, 1960; M.S., 1962; Ph.D., University of California, Irvine, 1972. Professor.
- WATERBURY, ARCHIE M. (1973) Biological Sciences
B.A., San Jose State College, 1966; M.A., 1968; Ph.D., University of California, Davis, 1972. Professor.
- WATKINS, HARRY S. (1992) Business Administration
B.S., Willamette University, 1972; M.B.A., University of Arizona, Tucson, 1978; Ph.D., University of Oregon, 1992. Associate Professor.
- WEATHERBY, JOSEPH N., JR. (1968) Political Science
B.A., Baylor University, 1958; B.F.T., American Institute for Foreign Trade, 1961; M.A., Baylor University, 1962; Ph.D., University of Utah, 1968; additional graduate study, Baldwin Wallace College, Ohio; Hamline University, Minnesota; American University, Cairo; Cambridge University. Professor.
- WEATHERFORD, ALAN M. (1986) Business Administration
B.A., Louisiana State University, 1969; A.D., Northwestern State University, 1977; M.B.A., University of Dallas, 1981; Ph.D., The University of Texas, Dallas, 1985. Associate Professor.
- WEBB, JAMES L. (1969) Physical Education and Kinesiology
B.S., University of North Dakota, 1962; M.S., 1963; Ph.D., University of Oregon, 1969. Professor.
- WEINSTEIN, STEPHEN T. (1969) Mathematics
B.A., University of Southern California, 1960; M.A., 1965; Ph.D., 1972. Professor and Department Chair.
- WEISENTHAL, HOWARD (1984) Architecture
B. Arch., University of Florida, 1972; M. Arch., 1974. Professor. Registered Architect, Florida.
- WENZL, MICHAEL J. (1969) English
B.A., University of Oregon, 1961; M.A., 1965; Ph.D., University of New Mexico, 1969; postdoctoral study, University of California, Berkeley. Professor.
- WESSELS, HENRY (1970) Art and Design
B.S., Northern Illinois University, 1957; M.F.A., University of Southern California, 1970. Professor.
- WESTOVER, JAMES D. (1971) Chemistry
B.S., Arizona State College, 1960; M.S., 1962; Ph.D., Brigham Young University, 1966. Professor.
- WHEATLEY, JO ANN C. (1980) Crop Science
B.A., Southeastern Louisiana University, 1961; M.S., California Polytechnic State University, San Luis Obispo, 1978; Ph.D., Louisiana State University, 1990. Professor.
- WHEATLEY, PATRICK O. (1970) Computer Science
B.A., St. Mary's Seminary, 1956; M.S., University of Chicago, 1963; Ph.D., University of Houston, 1970. Professor.
- WHITE, DONALD E. (1987) Industrial and Manufacturing Engineering
B.S., University of California, Berkeley, 1965; M.S., Stevens Institute of Technology, 1967; Ph.D., Case Western Reserve University, 1971; M.B.A., Pepperdine University, 1980. Professor.
- WHITEFORD, MARY A. (1982) Academic Programs
B.S., New York University, 1978. Academic Programs Analyst.
- WILK, EDWARD A. (1966) University Library
B.A., Western Michigan University, 1965; M.S.L., 1966. Associate Librarian.
- WILLIAMS, D. F. G. (1993) City and Regional Planning
B.A., London School of Economics, 1969; M.A., University of Southern California, 1970; M.U.P., University of Washington, 1972; Ph.D., 1974. Associate Professor.
- WILLIAMS, DOUGLAS W. (1983) Agricultural Engineering
B.S., Kansas State University, 1967; M.S., Iowa State University, 1969; Ph.D., University of California, Davis, 1973. Professor. Registered Mechanical Engineer, California.
- WILLIAMS, NANCY (1988) University Foundation
B.S., Illinois State University, 1973; M.A., Ball State University, 1980. Director, Campus Dining.
- WILLIAMSON, DANIEL P. (1970) Economics
B.A., University of California, Santa Barbara, 1966; Ph.D., University of California, San Diego, 1973. Professor.
- WILLIAMSON, DAVID G. (1968) Chemistry
B.A., University of Colorado, 1963; Ph.D., University of California, Los Angeles, 1966; postdoctoral fellow, National Research Council of Canada. Professor.
- WILLS, MAX T. (1967) Chemistry
B.S., University of Puget Sound, 1961; Ph.D., University of Washington, 1965. Professor.
- WILSON, JACK D. (1976) Mechanical Engineering
B.S., Michigan State University, 1956; M.S., 1958; Ph.D., 1968. Professor. Registered Professional Engineer, California and Georgia.
- WILSON, WALTER D. (1969) Physics
B.S., University of California, Berkeley, 1957; Ph.D., 1966. Professor.
- WILT, PETER J. (1983) Theatre
B.A., Brigham Young University, 1971; M.A. 1980. Manager, University Theatre.
- WILVERT, CALVIN H. (1973) Social Sciences
B.A., University of California, Los Angeles, 1963; M.A., University of California, Berkeley, 1967; Ph.D., 1971. Professor.
- WINEBRENNER, TERRENCE C. (1983) Speech Communication
B.S., Southwest Missouri State University, 1971; M.A., 1972; Ph.D., Ohio State University, 1985. Associate Professor.

- WINGER, DONLEY J. (1963)..... Electronic and Electrical Engineering
B.S., University of North Dakota, 1960; M.S., 1963; Ph.D., Iowa State University, 1971. Professor.
- WOLF, REX (1982)..... Administration and Finance
B.Arch., California Polytechnic State University, San Luis Obispo, 1979.
Architect, Facilities Planning.
- WOLF, ROBERT S. (1975)..... Mathematics
B.S., Massachusetts Institute of Technology, 1966; M.S., Stanford University, 1967; Ph.D., 1974. Professor.
- WOLLMAN, MICHAEL T. (1982)..... Electronic and Electrical Engineering
B.E.E., Cornell University, 1964; M.S., University of Hawaii, 1966; Ph.D., University of California, Santa Barbara, 1975. Professor.
- WOOLARD, DONALD S. (1986)..... Architecture
B.Arch., University of Auckland, 1964; M.F.A., University of Hawaii, 1970; Ph.D., University of Queensland, 1980. Professor. Registered Architect, Australia, California, New Zealand.
- WOOLPERT, JANIS K. (1982)..... College of Liberal Arts
B.S., Oklahoma State University, 1959. Administrative Operations Analyst.
- WOOTEN, RUDY A. (1977)..... Food Science and Nutrition
B.S., University of Arizona, 1971; M.S., 1973; Ph.D., 1976. Professor.
- WU, SING-CHOU (1969)..... Statistics
B.A., National Taiwan University, 1959; M.S., Utah State University, 1966; Ph.D., Colorado State University, 1970. Professor.
- YAMADA, KERRY T. (1981)..... Psychological Services
B.A., Dakota Wesleyan University, 1952; M.A., University of South Dakota, 1960; Ph.D., Ottawa University, Canada, 1968. Director, Health and Psychological Services.
- YANG, DAVID J. (1972)..... International Programs
B.A., Southern Illinois University, 1965; M.S., 1972. Director.
- YANG, TAO H. (1987)..... Industrial and Manufacturing Engineering
B.S., Tunghai University, Taiwan, 1978; M.S., San Jose State University, 1982; Ph.D., Arizona State University, 1987. Associate Professor.
- YEH, CHUAN-SUNG (1970)..... Electronic and Electrical Engineering
B.S., Naval College of Technology, Taiwan, 1953; M.S., National Chiao-Tung University, Taiwan, 1964; M.E., McMaster University, Canada, 1966; Ph.D., 1969. Professor.
- YIP, CHRISTOPHER L. (1988)..... Architecture
B.A., University of California, Berkeley, 1971; M. Arch., 1977; Ph.D., 1985. Associate Professor.
- YONEDA, STEVEN H. (1972)..... Intercollegiate Athletics
B.S., California State Polytechnic College, 1970; M.S. 1972; NATA Certified Athletic Trainer, 1975. Head Trainer.
- YONG, YUEN-CJEN (1978)..... Mechanical Engineering
B.E., University of Malaya, 1969; M.E., University of California, Davis, 1977; Ph.D., 1984. Professor.
- YORK, MARILYN R. (1975)..... International Programs
B.S., California Polytechnic State University, San Luis Obispo, 1974; M.A., 1981. Coordinator.
- YOSHIMURA, MICHAEL A. (1975)..... Biological Sciences
B.A., Stanford University, 1970; M.S., University of Hawaii, 1972; Ph.D., University of Arizona, 1975. Professor.
- ZAMMIT, RONALD E. (1986)..... Physics
B.S., Louisiana State University, 1969; M.S., Purdue University, 1971; Ph.D., 1975. Professor.
- ZETZSCHE, JAMES B., JR. (1968)..... Agricultural Engineering
B.S., Texas Technological College, 1962; M.S., 1967. Professor. Registered Agricultural Engineer, California.
- ZEUSCHNER, RAYMOND F. (1980)..... Speech Communication
A.B., University of California, Berkeley, 1966; M.A., San Francisco State College, 1968; Ph.D., University of California, Los Angeles, 1973. Professor and Department Chair.
- ZINGG, PAUL J. (1993)..... College of Liberal Arts
B.A., Belmont Abbey College, 1968; M.A., University of Richmond, 1969; Ph.D., University of Georgia, 1974. Dean.
- ZOHNS, MARK A. (1986)..... Agricultural Engineering
B.S., California Polytechnic State University, San Luis Obispo, 1981; M.S., University of California, Davis, 1983; Ph.D., 1986. Professor. Registered Mechanical Engineer, California.
- ZOHNS, MICHAEL D. (1974)..... Ornamental Horticulture
B.S., California Polytechnic State University, San Luis Obispo, 1972; M.S., 1975. Professor.
- ZUUR, THOMAS L. (1983)..... Academic Records
B.S., Sonoma State College, 1967; M.P.A., University of San Francisco, 1981. Registrar/Director.
- ZWEIFEL, K. RICHARD (1972)..... College of Architecture and Environmental Design
B.S.L.A., University of Wisconsin, 1970; M.S.L.A., 1975. Professor and Associate Dean. Registered Landscape Architect, California.

APPENDIX

"STUDENT-RIGHT-TO-KNOW" DISCLOSURE OF GRADUATION RATE

In 1991-92, the graduation rate for Cal Poly freshman who entered the university in Fall 1984, was 64%. For more detailed information, please contact Institutional Studies at 805 756-2204.

PRIVACY RIGHTS OF STUDENTS IN EDUCATION RECORDS

The federal Family Educational Rights and Privacy Act of 1974 (20 U.S.C. 1232g) and regulations adopted thereunder (34 C.F.R. 99) and California *Education Code* Section 67100 et seq., set out requirements designed to protect the privacy of students concerning their records maintained by the campus. Specifically, the statute and regulations govern 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 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 Judicial Affairs Office. Among the types of information included in the campus statement of policies and procedures are: 1) the types of student records and the information contained therein; 2) the official responsible for the maintenance of each type of record; 3) the location of access lists which indicate persons requesting or receiving information from the record; 4) policies for reviewing and expunging records; 5) the access rights of students; 6) the procedures for challenging the content of student records; 7) the cost which will be charged for reproducing copies of records; and 8) the right of the student to file a complaint with the Department of Education. An office and review board have been established by the Department to investigate and adjudicate violations and complaints. The office designated for this purpose is: The Family Educational Rights and Privacy Act Office (FERPA), U.S. Department of Education, 330 "C" Street, Room 4511, Washington, D.C. 20202.

The campus is authorized under the Act to release "directory information" concerning students. "Directory information" includes the student's name, address, telephone listing, date and place of birth, major field of study, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, degrees

and awards received, and the most recent previous educational agency or institution attended by the student. The 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 to be released. Written objections should be sent to the Director, Judicial Affairs.

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. Disclosure may also be made to other persons or organizations under certain conditions (e.g., as part of accreditation or program evaluation; in response to a court order or subpoena; in connection with financial aid; to other institutions to which the student is transferring).

USE OF 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.

CAREER PLACEMENT

The campus may 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.

STUDENT DISCIPLINE

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 or 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 of 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 non-accidental 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 California State University Trustees, academic, non-academic 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, slingshot, 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 or 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.

Among the specific causes for which the University will take such disciplinary action are: the bringing or drinking of alcoholic beverages on campus; being intoxicated on campus; repeated violations of campus rules and regulations, including those pertaining to driving and parking of vehicles.

In accordance with provisions of Section 41301 above, the President has issued and posted officially an order which prohibits the consumption, possession, or use of alcoholic beverages on campus. Students who violate this order are subject to the penalties provided for in Sections 41301 and 41302, Title 5 of the *California Administrative Code*.

Disciplinary action varies with the severity of the violation. If the unacceptable behavior involves use of motor vehicles, the student may be restricted from driving or parking on campus. If the unacceptable behavior involves matters pertaining to on-campus housing or dining, the student may be restricted from living or dining on campus.

INSTITUTIONAL AND FINANCIAL ASSISTANCE

The following information concerning student financial assistance may be obtained from the Director, Financial Aid, Administration 212, 756-2927:

1. student financial assistance programs available to students who enroll at Cal Poly;

2. the methods by which such assistance is distributed among recipients who enroll at Cal Poly;
3. the means, including forms, by which application for student financial assistance is made and requirements for accurately preparing such application;
4. the rights and responsibilities of students receiving financial assistance; and
5. the standards which the student must maintain in order to be considered to be making satisfactory progress for the purpose of establishing and maintaining eligibility for financial assistance.

The following information concerning the cost of attending Cal Poly is available from the Director, Financial Aid, Administration 212, 756-2927:

1. fees and tuition (where applicable);
2. estimated costs of books and supplies;
3. estimates of typical student room and board costs and typical commuting costs; and
4. any additional costs of the program in which the student is enrolled or expresses a specific interest.

Information concerning the refund policy of Cal Poly for the return of unearned tuition and fees or other refundable portions of costs is available from the Registrar, Administration 222, 756-2541.

Information concerning Cal Poly policies regarding any refund due to the federal Title IV student assistance programs as required by the regulations is available from the Director, Financial Aid, Administration 212, 756-2927.

Information concerning the academic programs of Cal Poly may be obtained from the Vice President for Academic Affairs, Administration 305, 756-2186. This information may include:

1. the current degree programs and other educational and training programs;
2. the instructional, laboratory, and other physical plant facilities which relate to the academic program;
3. the faculty and other instructional personnel;
4. data regarding student retention at Cal Poly and, if available, the number and percentage of students completing the program in which the student is enrolled or has 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 Disabled Student Services, University Union 202, 756-1395.

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 1993/94 (including capital outlay funding in the amount of \$240,459,000) is \$1,723,703,000. However, the total cost of education for CSU is \$2,081,064,210, which must provide support for a projected 247,494 full-time equivalent students (FTES). The number of full-time equivalent students is determined by dividing the total academic student load by 15 units per term (the figure used here to define a full-time student's academic load).

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 and lottery funds. 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, the average cost of education per FTE student is \$8,408. Of this amount, the average student fee support per FTE is \$1,978. (The State University Fee, application fee, and nonresident tuition are included in the average costs paid by the students; individual students may pay less or more than \$1,978, depending on whether they are part-time, full-time, resident, or nonresident students.)

	Amount	Average Cost Per FTE Student	Per- centage
Total Cost of Education	\$2,081,064,210	\$8,408	100.0
-State Appropriation	1,483,244,000	5,993	71.3
-Student Fee Support	489,572,610	1,978	23.5
-Support from Other Sources .	108,247,600	437	5.2

Index

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- Absence, leave of, 81, 94.
 - Academic calendar, 19.
 - Academic freedom, statement on, 31.
 - Academic obligations, 85.
 - Academic placement, 70.
 - Academic probation or disqualification, 86.
 - graduate students, 92.
 - Academic program changes, 74.
 - Academic programs, 22.
 - Academic renewal, 85.
 - Academic requirements and policies, 70.
 - graduate students, 91.
 - Academic residence requirements, 73.
 - Academic Skills Center, 50.
 - Academic standards, 85.
 - Academic year, 19.
 - Accounting, 165.
 - Accreditation, 28.
 - Activity classes, 18.
 - Add/drop, 81.
 - Administration, university, 488.
 - state board of trustees, 32.
 - Administrative-academic probation, 86.
 - Administrative services credential, 309.
 - Admissions, 54.
 - graduate, 89.
 - undergraduate requirements, 55.
 - Advanced placement, 71.
 - Adult students, 57.
 - Aeronautical engineering, 188.
 - M.S. program, 192.
 - Aeronautics concentration, 188.
 - Agribusiness, 104.
 - minor, 106.
 - specialization, 163.
 - Agribusiness finance and appraisal concentration, 104.
 - Agribusiness marketing concentration, 104.
 - Agribusiness policy concentration, 104.
 - Agricultural business, 104.
 - Agricultural education, 107.
 - Agricultural engineering, 110.
 - Agricultural engineering technology specialization, 102.
 - Agricultural enterprise projects, 99.
 - Agricultural mechanics concentration, 107.
 - Agricultural products and processing concentration, 107.
 - Agricultural resources management concentration, 107.
 - Agricultural science, 107.
 - Agricultural supplies and services concentration, 107.
 - Agricultural systems management, 110.
 - Agricultural teaching credentials, 107.
 - Agriculture, M.S. program, 101.
 - College of, 98.
 - Alumni Association, 36.
 - Animal production concentration, 107.
 - Animal science, 115.
 - Anatomy-physiology concentration, 274.
 - Anthropology, 264.
 - Anthropology/geography minor, 264.
 - Application filing period, 54.
 - Application for graduation, 74.
 - graduate students, 94.
 - Applied art and design, 231.
 - Applied developmental psychology concentration, 257.
 - Applied family psychology concentration, 257.
 - Applied social psychology concentration, 257.
 - Architectural engineering, 144.
 - Architectural management track, 148, 163.
 - Architecture, 146.
 - M.S. program, 149.
 - off-campus programs, 42, 146.
 - Architecture and Environmental Design, College of, 143.
 - Art, minor, 233.
 - Art and design, 231.
 - ASI Children's Center, 45.
 - Associated Students, Inc., 45.
 - Astronautics concentration, 188.
 - Astronomy, 342.
 - in physical science major, 294.
 - Athletics, 52.
 - eligibility, 86.
 - Attendance, 81.
 - Auditing of courses, 83.
 - Average annual cost of education, 522.
-
- Bachelor's degree requirements, 73.**
 - definition, 17.
 - second degree, 74.
 - Bacteriology, 38, 274, 342.
 - BCLAD, 307.
 - Bilingual crosscultural language and academic development (BCLAD), 307.
 - Biochemical engineering specialization, 184.
 - Biochemistry, 281.
 - Biological sciences, 274.
 - M.S. program, 280.
 - Biology, concentration, 274.
 - Biotechnology minor, 273.
 - Botany, 274, 346.
 - Business administration, 167.
 - master's program, 162.
 - Business and industrial economics concentration, 169.
 - Business minor, 161.
 - Business, College of, 160.
-
- Calendar, academic, 19.**
 - California State University, 32.
 - Cal Poly, 7.
 - Campus map, inside back cover.
 - Campus organizations, 45.
 - Campus student relations, 31.
 - CAPTURE, 81.
 - Career Services, 48.
 - Catalog, choice of, 73.
 - guide to, 17.
 - Center for Teacher Education, 303.
-

-
- Change of major, 74.
 - rules and policies, 2.
 - Cheating and plagiarism, 31.
 - Chemistry, 281.
 - Children's Center, 45.
 - City and regional planning, 150.
 - M.C.R.P., 152.
 - M.C.R.P./M.S. Engineering, 153, 187.
 - Civil engineering, 193.
 - Civil and environmental engineering, M.S., 198.
 - CLAD, 307.
 - Class attendance, 81.
 - College level examination program (CLEP), 72.
 - Commencement, 75.
 - Commercial/corporate fitness concentration, 289.
 - Commercial/tourism management concentration, 135.
 - Community service, 47.
 - Comprehensive examination, 93.
 - Computer engineering, 200.
 - Computers and printing technology concentration, 240.
 - Computer facilities, 36.
 - Computer science, 203.
 - M.S. program, 207.
 - minor, 206.
 - Concentrations, definition, 18.
 - list of, 22.
 - Concurrent enrollment, 37.
 - Conduct and discipline, 87.
 - Conferences, 37.
 - Conservation, 278, 357.
 - Construction management, 154.
 - Continuing education in agriculture, 37.
 - Cooperative education, 48.
 - Counseling and guidance specialization, 305.
 - Counseling services, 48, 50.
 - Course numbering system, 18.
 - Courses, definition, 17.
 - Courses of instruction, 311.
 - Craft Center, 45.
 - Credentials, 307.
 - Credit by examination, 72.
 - Credit cards, use of, 62.
 - Credit for, community college courses, 71.
 - military service, 71.
 - noncollegiate instruction, 71.
 - Credit/no credit grading, 83.
 - graduate students, 93.
 - Criminal justice concentration, 263.
 - Crop science, 117.
 - Crosscultural language and academic development (CLAD), 307.
 - Cross-cultural studies concentration, 263.
 - CSU, 32.
 - Culminating experience, 93.
 - Cultural pluralism requirement, U.S., 76.
 - Curriculum, change of, 74.
 - substitution, 74.
 - Curriculum and instruction specialization, 305.
 - Dairy products technology specialization, 102.**
 - Dairy science, 123.
 - Dance minor, 269.
 - Dean's list, 75.
 - Debts owed to the university, 62.
 - Definitions, 17.
 - Degree, definitions, 17.
 - programs, 22.
 - requirements, 73.
 - Design reproduction concentration, 240.
 - Determination of residence for nonresident tuition purposes, 58.
 - Dining halls, 49.
 - Diploma regulations, 74.
 - Disabled Student Services, 50.
 - Disciplinary procedures, 87.
 - Discrimination, statement on racism and, 31.
 - Dismissal, 86.
 - Disqualification, 86.
 - Distinguished teachers, 493.
 - Double majors, 74.
 - Dropping a class, 81.
 - Duplicate degree tuition, 61.
 - Early childhood education concentration, 257.**
 - Ecology and systematic biology, 274.
 - Ecology concentration, 275.
 - Economics, 169.
 - minor, 171.
 - Education, 303.
 - M.A. program, 304.
 - Educational administration specialization, 306.
 - Educational leave, 81.
 - Educational Opportunity Program, 51.
 - Electrical engineering, 208.
 - M.S. program, 211.
 - Electronic and electrical engineering, 208.
 - Electronics concentration, 294.
 - Electro-optics concentration, 294.
 - Elementary education, 307.
 - Eligibility, athletic, 86.
 - student activities, 87.
 - ELM (Entry level mathematics), 70.
 - Employment, students, 48.
 - Engineering, College of, 180.
 - M.S. program, 183.
 - Engineering management specialization, 164, 186.
 - Engineering science, 212.
 - English, 234.
 - M.A. program, 237.
 - minor, 236.
 - English placement test, 70.
 - Enrollment in programs, 26.
 - Enterprise project, 99.
 - Entry level mathematics (ELM) requirement, 70.
 - Environmental design, 143.
 - concentration, 156.
 - specialization, 149.
 - Environmental engineering, 193.
 - Environmental management concentration, 132, 139.
 - Environmental science and technology concentration, 139.
 - Escape Route, 45.
 - Ethics and society concentration, 252.
 - Ethnic Studies, 301.
 - minor, 301.
-

Evaluation for graduation, 74.
 Examination, credit by, 72.
 physical, 82.
 Expenses, 61, 63.
 Experimental classes, 18.
 Expulsion, 86.
 Extended Education, 37.
 Extension program, 37.
 credit for courses, 37.

Facilities, 11.
 Faculty, list of, 497.
 emeriti, 489.
 Fairness Board, 87.
 Farm and ranch concentration, 104.
 Fees and expenses, 61.
 Financial aid, 63.
 Financial management concentration, 167.
 First class meeting, 81.
 Fisheries, marine biology and, concentration, 275.
 Food science, 124.
 minor, 128.
 Food science and nutrition, 124
 specialization, 102.
 Food service, 49.
 Foreign languages, 238.
 Foreign students, 57, 91.
 Forest resources—management concentration, 132.
 Forest resources—urban forestry concentration, 132.
 Forest resources—watershed, chaparral, and fire management
 concentration, 132.
 Forestry and natural resources, 131.
 Formal study plan, 93.
 Foundation, 37.
 Fraternities, 45.
 French minor, 238.
 Freshman requirements, 55.
 Fruit science, 117.

Galerie, 46.
 Gender harassment, 30.
 General agriculture specialization, 103.
 General education-breadth requirements, 73, 77.
 Geography, 264.
 German minor, 238.
 Gerontology minor, 258.
 Grade point average, 73, 83.
 graduate students, 94.
 Grade requirements, 73, 83.
 Grading, 83.
 Graduate academic requirements, 91.
 Graduate admission, 89.
 Graduate courses taken by undergraduates, 75, 94.
 Graduate programs, 89.
 Graduate standing, 90.
 Graduation, evaluation for, 74.
 graduate students, 94.
 Graduation requirements, 73.
 graduate students, 92.
 Graduation with honors, 75.
 Graduation writing requirement, 74.
 graduate students, 94.

Grants, 68.
 Graphic communication, 240.
 minor, 242.
 Graphic design concentration, 231.
 Grievance procedures, 87.
 Guide to using Cal Poly catalog, 17.

Harassment, sexual, 29.
 gender, 30.
 Health education concentration, 289.
 Health professions, 38.
 services, 49.
 screening, 82.
 High school students, 57.
 Higher education GPA, 83.
 History, 243.
 minor, 243.
 History of Cal Poly, 13.
 Holding records, 81.
 Holidays, school, 19.
 Honors, 75.
 Housing services, 49.
 Human development, 257.
 Human resources management concentration, 176.
 Humanities, 228.

Immunizations, 82.
 Incomplete, grade of, 84.
 Industrial and manufacturing engineering, 215.
 Industrial and technical studies, M.A., 175.
 Industrial engineering, 215.
 specialization, 184.
 Industrial technology, 172.
 Institutional and financial assistance, 521.
 Integrative technology minor, 172.
 Intercollegiate athletics, 52.
 eligibility, 86.
 International agriculture specialization, 103.
 International affairs concentration, 254.
 International business management concentration, 176.
 International (foreign) students, 57, 91.
 International programs, 41.
 International relations minor, 256.
 International trade and development concentration, 169.
 Italian, 238.

Japanese, 238.
 Journalism, 245.
 Judicial affairs, 31.

Laboratory classes, 18.
 Land resources concentration, 139.
 Landscape architecture, 156.
 Late registration, 81.
 Leave, of absence, 81, 94.
 medical, 81.
 planned educational, 81.
 Lecture classes, 18.
 Liberal Arts, College of, 228.
 Liberal studies, 247.
 Library, Robert E. Kennedy, 40.

-
- Linguistics minor, 236.
 - Living expenses, 50, 63.
 - Loan funds, 67.
 - London study program, 42.
 - Majors**, definition, 17.
 - change of, 74.
 - courses, 17.
 - list, 22.
 - Management, 176.
 - concentration, 176.
 - Management information systems concentration, 176.
 - Manufacturing engineering, 215.
 - MAPE (Mathematics placement exam), 71.
 - Marine biology and fisheries concentration, 275.
 - Marketing management concentration, 167.
 - Marriage, family and child counseling license (MFCC), 262.
 - Master's degrees, 89.
 - Master of business administration (MBA), 162.
 - MBA/MS Engineering, 164, 186.
 - Materials engineering, 221.
 - specialization, 184.
 - Mathematics, 285.
 - entry-level requirement (ELM), 70.
 - minor, 287.
 - M.S. program, 288.
 - placement examination (MAPE), 71.
 - Maximum unit load, 81.
 - MCRP, 152.
 - MCRP/MS Engineering, 153, 187.
 - Meal plans, 49, 61.
 - Measles immunizations, 82.
 - Mechanical engineering, 224.
 - specialization, 184.
 - Medical leaves of absence, 81.
 - Medical service, 49.
 - Microbiology, 274.
 - Military Science, 129.
 - Military service, credit for, 71.
 - Minority engineering program, 51.
 - Minors, 75.
 - definition, 18.
 - Modes of instruction, 18.
 - Multicultural Center, 46.
 - Multiple subject teaching credential, 307.
 - Music, 250.
 - minor, 251.
 - Natural resources management**, 131.
 - Nondiscrimination policy, 29.
 - Nutritional science, 124.
 - minor, 128.
 - Organizations** concentration, 263.
 - Ornamental horticulture, 137.
 - concentration, 107.
 - Outstanding staff, 496.
 - Overseas programs, 41.
 - Packaging** minor, 173.
 - Paris study program, 42.
 - Parks and forest recreation concentration, 131.
 - Philosophy, 252.
 - minor, 252.
 - Photography concentration, 231.
 - Physical education, 289.
 - M.S. program, 292.
 - Physical science, 294.
 - Physics, 294.
 - Placement services, 48.
 - Placement tests, 70.
 - Plagiarism and cheating, 31.
 - Planned educational leave, 81.
 - Plant production concentration, 107.
 - Plant protection minor, 121.
 - Plant protection science, 117.
 - Policies on the rights of individuals, 29.
 - Political science, 254.
 - Polymers and coating concentration, 281.
 - Postbaccalaureate applicants, 90.
 - Poultry management minor, 115.
 - Prefixes, colleges, departments, and courses, 312.
 - Pre-law concentration, 254.
 - Pre-physical therapy concentration, 289.
 - Preprofessional preparation, health services, 38.
 - Prerequisites, 18, 81.
 - graduate students, 95.
 - Presidents, past Cal Poly, 489.
 - Honors list, 75.
 - Printing management concentration, 240.
 - Privacy rights, 519.
 - Probation, 86.
 - graduate students, 92.
 - Production and operations management concentration, 176.
 - Professional practice specialization, 149.
 - Program board, 46.
 - Program changes, 74.
 - Project report, 95.
 - Psychological Services, 50.
 - Psychology, 257.
 - minor, 258.
 - M.S. program, 261.
 - Psychology and human development, 257.
 - Public administration concentration, 254.
 - minor, 256.
 - Pupil personnel services credential, 309.
 - Quality** hours, 83.
 - points, 83.
 - Quantitative economics concentration, 169.
 - Quarter system, 18.
 - units, 18.
 - Racism**, statement on, 31.
 - Reading/language arts specialist credential, 309.
 - Reading specialization, 306.
 - Recreation administration, 135.
 - Recreational sports, 46.
 - Recreation and open space concentration, 156.
 - Recreation Center, 47.
 - Refund of fees, 62.
 - Regional landscape assessment concentration, 156.
-

Registration, 81.
 fees, 61.
 Repeating a course, 84.
 graduate students, 95.
 Requirements, general education, 77.
 Requirements, graduation, 73.
 Research and Graduate Programs, 89.
 Research and project involvement, 40, 95.
 Residence, academic requirements, 73.
 determination, 58.
 halls, 49.
 Residential Life and Education, 49.
 Returning students, 57, 82.
 Rights of the individual, 29.
 Rose float, 47.
 ROTC, 129.
 Rules and policies, changes in, 2.

Satisfactory progress, 84.
 Scholarships, 63.
 Science and Mathematics, College of, 272.
 Second, bachelor's degree, 74.
 master's degree, 95.
 Secondary school teaching, 307.
 Senior project, 73.
 Sexual harassment policy, 29.
 Single subject teaching credential, 307.
 Social sciences, 263.
 Social security number use, 519.
 Social services concentration, 264.
 Sociology, 263.
 Soil science, 139.
 specialization, 103.
 Sororities, 45.
 Spanish minor, 239.
 Special education credential, 310.
 specialization, 306.
 Specializations, 22.
 definition, 18.
 Speech communication, 267.
 minor, 267.
 Staff emeriti, 494.
 State university fee, 61.
 Statement of intent to register (SIR), 54.
 Statement on academic freedom, 31.
 Statement on racism and discrimination, 31.
 Statistics, 298.
 minor, 298.
 Student Academic Services, 50.
 Student activities, 45.
 eligibility, 87.
 Student classification, 72.
 Student conduct and discipline, 87, 519.
 Student employment, 48.
 Student government, 45.
 Student organizations, 45.
 Student services, 48.
 Students serving in the community, 47.
 Student support services, 51.
 Study abroad, 41.
 Summer Institute, 51.
 Support courses, 17.

Systematics concentration, 275.
 Systemwide tests, 70.

Teacher preparation, 307.
 Teaching credentials, 307.
 (Physical Education) concentration, 289.
 (Political Science) concentration, 254.
 (Social Sciences) concentration, 263.
 Teaching English as a second language (TESL) certificate program, 236.
 Technical communication certificate program, 236.
 Testing office, 50.
 Tests and examinations, admission, 57.
 English placement (EPT), 70.
 Entry level mathematics (ELM), 70.
 systemwide requirements, 70.
 Theatre, and dance, 269.
 minor, 270.
 Thesis, 95.
 Time limit, graduate students, 96.
 TOEFL, graduate students, 91.
 undergraduate students, 57.
 Transfer, credit, 71.
 requirements, 56.
 Transportation planning specialization, 153, 187.
 Travel Center, 47.
 Tuition, determination of residence for nonresident tuition, 58.
 fees, 61.

Unit load, 81.
 Units, definition, 18.
 number required, 73.
 University Center for Teacher Education, 303.
 University development, 43.
 University union, 47.
 University year, 18.
 Upward Bound, 51.
 Urban studies concentration, 254.
 U.S. cultural pluralism requirement, 76.

Values, technology and society minor, 229.
 Vegetable science, 117, 483.
 Veterinary science, 38, 40, 484.
 Vocational agriculture, 41.
 Vocational education, 172.

Water engineering specialization, 185.
 Water science minor, 100.
 Week of welcome (WOW), 47.
 Wildlife biology concentration, 275.
 Withdrawal from courses, 85.
 for term, 85.
 from previous terms, 85.
 Writing, graduation requirement, 74.
 Women's programs and services, 48.
 Women's Studies, 230.
 Workshops, 37.

Zoology, 274, 484.

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